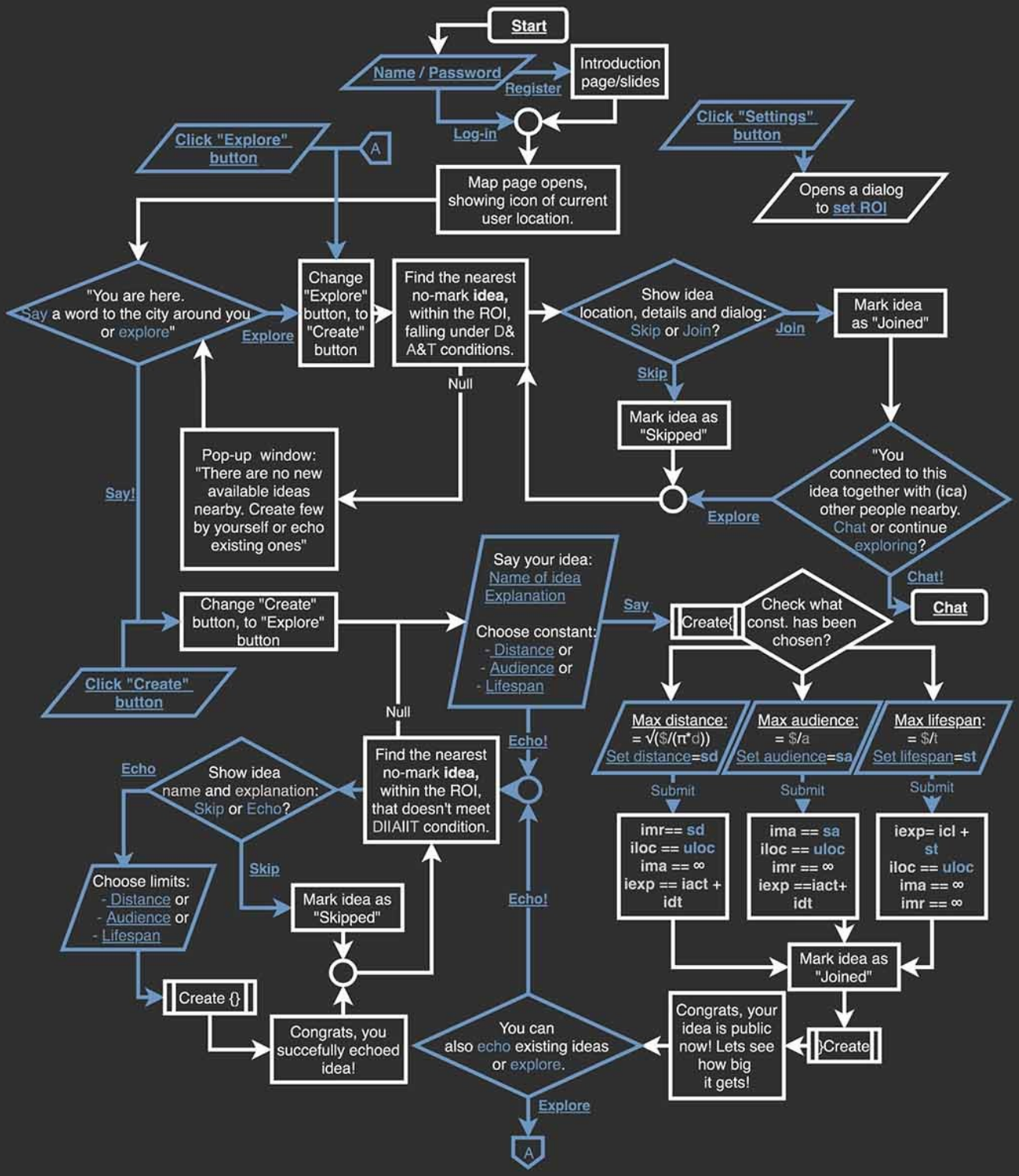
Digital Infrastructure
for Civic Self-governance



Do it ourselves: Digital platform for self-organisation in urban planning - research through design

Herman Mitish

Tampere University of Technology

Abstract

In the beginning of new century, on the wave of ICT pervasion collaborative urban design was expected to boost, but digitalization of established practices was far to be a cure-all solution. Many successful planning systems eventually discredited themselves in the face of challenges of 21st century: to recognize broad public as an equal actor in the process of decision-making; to revise notion of value in a changing economic and political reality; to take into consideration informal manifestations of urban life; to process, interpret and use overwhelming amounts of data in a legitimate way. Effective comprehensive solution for these challenges does not lie in neither of existing fundamental planning paradigms. Hypothesis behind this work is that it can naturally emerge, based on self-organizing capacities of humankind accompanied with technological innovation. As we witness success of self-organizing online communities operating in the reality of shared economies and urban commons, we need to take part in the design of new digital infrastructures, that would facilitate the emergence of new communities that would better serve our common needs and aspirations. The first aim of this work is to theoretically describe technological artifacts, that are needed to facilitate the emergence and becoming of bottom-up urban planning initiatives. Technology can play crucial role, helping us to reflect on our society, to identify convergence amongst our needs and wishes, to inform us about potentials for local cooperation and to facilitate the process of collaborative design and decision-making. The second, practical goal, is to implement prototypes, test them in the real life, analyze results and iteratively develop further.

Keywords

participatory planning, self-organization, crowdsourcing, social networking

Acknowledgements

I want to express my gratitude to my supervisor Professor Panu Lehtovuori, who has been guiding me along my studies and I am also sending my greetings to Minna Chudoba, Jaana Vanhatalo and Jenni Partanen, and to all professors, researchers and staff from the Architectural department and my fellow students. I very much appreciate the work that we have done together with Damiano Cerrone, SpinUNIT and all the participants of the Metamorphology Lab that took place in TUT on summer 2017 and gave me the impulse to move towards this thesis work.

I am grateful to professor Harry Edelman for Sustainable design course and Negotiating Sustainable Change - for introduction into the negotiation techniques and lobbying, and for the great lesson of how not be afraid to apply emerging technologies where they are needed. I am also thankful to Professor Juho Hamari from UTA, who shared his time and expertise in the field of Game Studies and guided me along this work. I was lucky to have inspiring interviews with Rodrigo Coloma from Tampere Municipality, and with Natalia Rincon, the founder of the Chaos Architects and The Happy City start-up in Helsinki. I am grateful to organizers and participants of all the academic events I was lucky to attend, that helped me a lot to proceed with this work, namely seminar on Urban Participation from Dwellers in Agile Cities consortium, Finnish Urban Studies Days, TUT's conference "Complexity and Urban Planning", Urban Education Live conference in Venice and in Bucharest, "Numbers and Cognition" summer school in EKA, Tallinn.

I am grateful to the Building Information Foundation (Rakennustietosäätiö) for financial support and a great trust they put in me and my work. Grateful to my collaborator Muhammad Fahad who stands behind most of web development of the Reflection.City app. I express my gratitude to the whole EASA community (European Architectural Student Assembly) for the great support and wide participation in my experiment, and to Croatian team of students who hosted and organized EASA 2018 Rijeka, where it took place. I am grateful to all my friends for sharing with me all the fun as well as long cold winters during these years, and especially to Maria Pastukh for initial inspirational idea behind this thesis. I am the most grateful to my family who were always helping and supporting me and to whom I send all my love.

Preface

Since first days of my MSc in Architecture program in Tampere University of Technology I got passionate of urban studies, as the issues related to it appeared to me so complex and so fundamentally important. It was also the beginning of my love relationship with big data, as it seemed ubiquitous, mysterious or even sacred, accessible only for few. The goal of the first Urban Planning project back then was to propose a development strategy for the Finnish city of Pori, basing on comprehensive GIS data. Me and my group-mates were thinking big and considered next few hundred years as a time scope for the project. Our final proposal was a response to all the seemingly obvious anticipations for upcoming epoch, such as global warming and sea level rise and overpopulation of Earth. Along first rough estimations, we realized that in the worst case scenario the city's to be 70% sank, featuring subtropical climate straight in the middle of Finland. Together with it we were expecting exponential population growth and anarchy on the edge of chaos, in case Kela and Finish welfare system cannot handle it all no more. However, our final proposals were very optimistic, as with a help of almighty data we envisioned adaptive solutions of all scales along all stages of disaster, and hoped for self-organizing civic governance to emerge, thanks to the future developments in ICT.

The next step on my way towards this thesis was Metamorphology Lab summer school, organized by SpinUNIT. Objectives and methods of it were already familiar to me, but that time we had to carry out research in more topical manner on the Helsinki city center. We have had amazing up-to-date databases of media- and meta-data from Instagram, Foursquare, Twitter and Airbnb for the area of interest, collected in a timespan of one year from 2014 to 2015. Our team did vast comparative analysis of 16 most popular and most populated districts of Helsinki, and produced extensive reports regarding sufficiency of their infrastructure and prevailing functions; image on social media; daily, weekly and monthly social activity rhythms, etc. And that was the first time, when I came up with that critical question - whether data analysis can be used to influence political and decision-making processes, and what are the ethical aspects of it? Along with discussions I get to realize that the outcomes of data analytics, if ever used textually e.g. as a guide for city development, could in fact misrepresent people and lead to doubtful decisions. Further elaborating on it I get to understand, that big data analysis (as well as its most known and simple form - public voting) is explicitly the process of reflection on a current state of society. It can be good to set priorities and to make diagnoses, but it is not sufficient to define or create the future. Though I still

felt, that data, intentionally generated by citizens, is capable to uncover the world of opportunities for citizens personally and can be a powerful tool for building new self-conscious societies.

With this idea in mind I was enrolled to the third important course within my program called Sustainable Design Studio. The scale of the project was substantially lower than in the previous projects and the goal was to investigate the case of Tampere central street, Hameenkatu. In an absolutely free fashion we had to identify it's planning issues and propose solutions to resolve them, employing innovative technological artifacts along the way. After short brainstorming within the group, idea was found and implementation started – we've made VR interface with realistic virtual environments (captured as spherical stereoscopic video), representing observer standing in the place of interest on Hameenkatu. Then we gave this observer a tools to point and then qualitatively evaluate spatial elements of his or her environment in 3d – problematic ones or otherwise. For the sake of simplicity, the tool allowed to evaluate objects only as "good" or "bad". Every time when player placed the pointer to the object of her interest and pressed one of two buttons, the picture with it was saved to one of two folders, depending on the evaluation given. After collecting this data from all the players we used pattern recognition algorithms to find possible convergences within people's preferences on the most problematic and the most favorable elements of street design of given spaces. We have collected first test data-set from around 30 players, mostly students of TUT, and also a lot of feedback through questionnaires. Although experiment by itself was quite successful considering amount of data we managed to collect (up to thousand pictures with evaluations, and around 30 questionnaires + interviews), the results of the pattern recognition happened to be too generalized and ambiguous – which was predictable for the central street in perfect condition. Participants were dissatisfied that they cannot choose the place of their interest, and also with the fact, that they cannot trace what is going to happen with their inputs afterwards and how pattern recognition algorithm is going to interpret them. It was further approval of my concerns regarding ethical and political problematics of such method and further motivation to go forward. The next challenge for me was to develop such a system where people would not only consciously and intentionally generate data, but also collectively process it, interpret and use for their own needs.

“We don't need other worlds. We need a mirror. We struggle to make contact, but we'll never achieve it. We are in a ridiculous predicament of man pursuing a goal that he fears and that he really does not need. Man needs man!”

Dr. Snaut, Solaris

Structure:

1. Introduction
    - 1.1. Research question
    - 1.2. Structure of the work
    - 1.3. Methodology
2. Context and Conceptual Framework
    - 2.1. Self-organization in urban planning
    - 2.2. Commons economy and value systems
    - 2.3. Technologies for networking and self-governance
3. Defining Innovation
    - 3.1. Defining concept
    - 3.2. Setting specifications
    - 3.3. Modelling use case
4. Design of the Prototype
    - 4.1. Design process
    - 4.2. Research case
    - 4.3. Results
5. Conclusion

    Reflections

1. Introduction

Today, in the age of active citizenship, economies of sharing, civic technologies and changing value systems the important question we need to ask ourselves - what does lead us in this change, where do we want to get and what is our role in the new world, as individuals and as architects? With a better means of communication and mobility we eventually realize that people all around the world often share the same needs, face the same challenges and better accomplish them together. In fact, the global problems we face nowadays are impossible to resolve only by local action, thus only in context of wide cooperation beyond the borders these can be managed. There is also an economical driver - we can minimize personal expenditures as well as potential losses and risks, by sharing the production and maintenance costs of our commons. Emerging technological services and goods, of nearly zero marginal cost make them especially easy to reproduce and share for a common good. Of course, there are many other factors shaping our common reality, but the fact is that cooperative practices are having revival all around the world, very much facilitated by technological innovation and ICT. The main actors in these cooperative horizontal systems are individuals, thus our role as individuals in the new world is increasingly important. As an architects though, we need to ask ourselves what will be the urban planning system, capable to operate in such collaborative communitarian future, how can we shape it and how does it affect the future of our cities? In this work I strive for conceptualization of digital platform for collaborative self-governance in spatial planning within numerous theoretical frameworks from different fields of research. I also attempt to describe sufficient economical eco-system and system of values for such a platform. Through multidisciplinary collaboration I will develop a working prototype of such a platform, to test it in real life settings. Analysis of collected data will be the ground for the next iteration of the development of proposed artifact and of theory behind it. My ultimate goal is to investigate and develop new socially sustainable modes of organization and planning, develop a digital infrastructure for it and to incorporate it in planning practice in Finland, Ukraine and worldwide.

1.1. Research question

The research question of this thesis is:

What digital platform is needed to facilitate emergence and becoming of civic initiatives in spatial planning?

This research question consists of four sub-questions:

- *What theoretical frameworks fit best to describe such a digital platform?*
- *What must be the key features of such a digital platform?*
- *What are the best means for implementation of such a digital platform?*
- *How does such a digital platform work in reality?*

1.2. Structure of the work

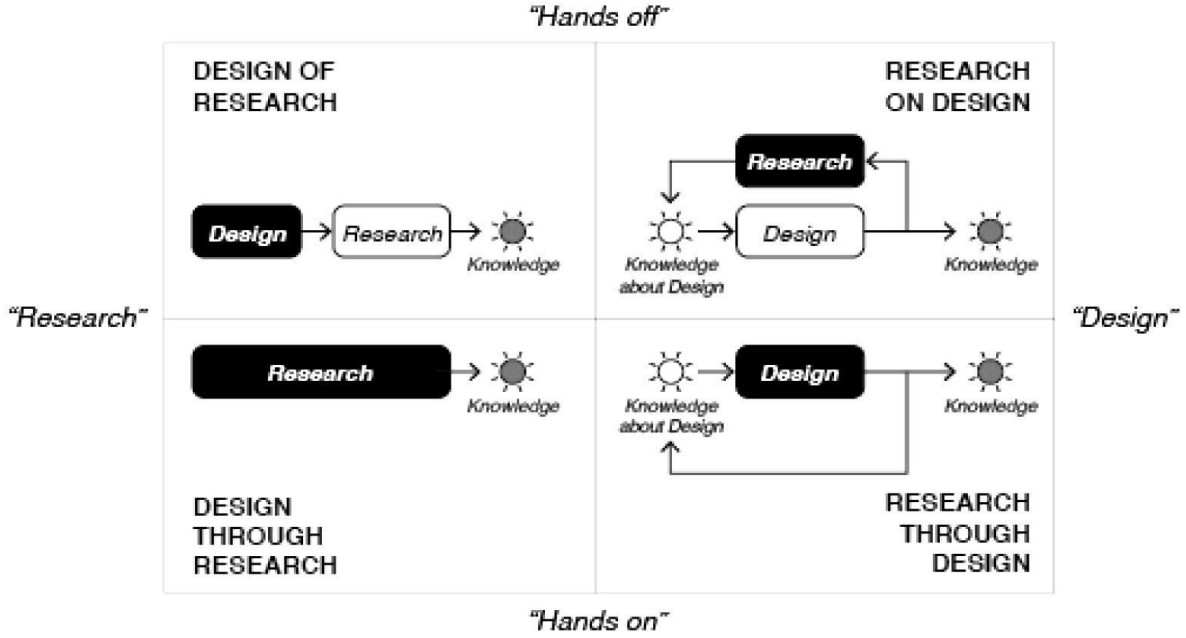
Research process will be divided into three parts: theoretical and conceptual development of digital artifact, practical implementation of it, and experimental testing in real-life research case. The work employs various analytical methods and practical approaches borrowed from different adjacent fields of research. The structure of the work is aligned along the process of realization of the artifact, starting from initial background study, theoretical development of the artifact, its realization, testing and following analysis of results. First part will include conceptualization of subject, literature review, interviews with a specialists and stakeholders and collaboration with case study community through thematic questionnaires in social media or in person.

Second part will be focused on design process, synthesis of given input, concept development, technical implementation. It is based on design science methodology, and uses Action Design Research framework (Sein et al., 2011) combined with ideas of end-user design and meta-design. The digital artifact will be of tertiary nature, basically providing users with tools to design their own participatory planning system. Given research will focus on the tertiary design process, and outcomes of its application on the secondary and primary levels. Secondary level would represent user interaction, dissemination and convergence of information generated by users, and primary level would evaluate realization of emerged initiatives.

The third stage of a project is dedicated to experiment on testing the prototype in the real-life case and analysis of collected data, with a purpose to answer research questions and to produce knowledge necessary for new iteration of design research. What makes design experimentation scientific research method? Following Waern & Back (2015, p. 350), first of all its research aim, to find more general knowledge about subject, e.g. through designing, understand more about design principles for socio-digital systems. Second - it's a certain level of rigor, necessity to organize and

document research throughout whole design process. The process of implementation of this stage can be largely shaped by ideas and methodology of Action design and Action research. It may also include field work with involved communities, for example placemaking activities under the framework of Project for Public Space methodology or activities of Tactical urbanism under its own framework. However, as this work should be considered as research in urbanism, it should not limit itself to physical dimension of the city. As early as on 1938 Louis Wirth bequeathed: we should not "identify urbanism with the physical entity of the city". Instead we will try to go "beyond an arbitrary boundary line" to consider how "technological developments in transportation and communication have enormously extended the urban mode of living beyond the confines of the city itself."

1.3. Methodology



From Faste & Faste, 2012, *Four categories of design research*

Design research generally can be divided in four domains across axes: "Research" vs. "Design", "Hands-off" vs. "Hands-on". Two "hands-off" domains represent research into the process of design: research on design deriving from work in design methods including work on methods of research design. "Hands-on" domains include research through design - research embedded within the process of design, and design through research, which is synonymous to research practices of other conventional fields of research (Faste & Faste, 2012). Given project belongs to "Design/Hands-on" quadrant of above mentioned coordinate system, and the "Research through design" model will be used as a general epistemological framework of it. Reasons behind the choice of this model are grounded on the overall experimental and interdisciplinary nature of the research, which requires generous sources of data, while subjects' precedents are absent or not available. Also, there are solid

theoretical and empirical foundations in related fields and available emergent technology necessary for implementation. Self-reflective and collaborative design process, rooted in an existing research body is expected to result in a working model, which then expected to serve as a main source of data for further analysis. Also, according to Hevner et al., 2004 “design research may be used for a wide array of evaluations: observational, analytical, experimental, testing, and descriptive evaluations”, which allows needed flexibility to collect diverse data for multidisciplinary experimental project.

According to Waern & Back (2015, p. 344) experimental part of a project may also belong to the category of Evocative Design Experiment borrowed from Game Research methodology. Below we will rephrase their notions on game design for the use in ICT development, by replacing ‘*game*’ with ‘*ICT artifact*’ (meaning our digital platform), ‘*player*’ with ‘*user*’, ‘*play*’ with ‘*use*’, etc. So: “The major goal for this type of design experimentation is to explore the design space of proposed [*artifact*], by understanding more about the behavior and experiences that a design choice will evoke in its [users]. When the design manifest in material form it ‘talksback’ to the designer, highlighting qualities of the idea that were previously unarticulated or even unintended. Since design of [*ICT*] is second [or third] order design, such artifacts do not manifest in sketches, but by being [*used*] “. Crucially important point in methodology of such experiments is research rigor and abundant documentation. “The pervasive [ICT] experiment requires extensive documentation, both in terms of filming, recording and logging [user] behaviour, and [user’s] active reporting of their [user] activities and experiences. It may be necessary to emphasise quality over quantity in data collection (Stenros et al., 2011). Rich data is necessary in order to be able to deconstruct the [use] behaviour to identify instances of [use] that reflect particular ICT design elements. These can then be scrutinized in detail, to understand something about their effects on player behaviour and experience.” (Waern & Back, 2015, p. 349)

From the technical side it is expected to be the most feasible to fully develop design prototype within the project in order to evaluate effectiveness of given design model. It is due to the fact that specified technology potentially could be used by designers with basic or no software development skills (employing Unreal Engine & ARCore SDK), as it provides user-friendly visual programming interface and abundance of support and technical documentation. It has also flexible licensing policy, which allows to implement fully functioning small scale prototypes or non-commercial products for free. Development of a digital artifact from scratch would allow great flexibility in further research, as all research problems imaginable could be investigated e.g. by using “extensive modding” approach (Mohseni et al., 2015, p. 325).

2. Context and Conceptual Framework

In this chapter we will try to outline main conceptual premises and core theories which serve as a basis for this work. There is an overview of fundamental paradigms of urban planning and democratic theories, in their historical and evolutionary perspectives. These are also poststructuralist ontologies including Theory of Complex Systems, Actor-Network Theory and Assemblage Theory and their interpretations in their relation to emergence of civic initiatives. There are conceptualizations of the emerging economic paradigms such as sharing economy or economy of commons in contradistinction with currently existing capitalist market economy, and also within the historical perspective. In the end there is an overview of existing technological artifacts in different ways related to this project and corresponding to above-mentioned theoretical frameworks - some could be used as prototypes, some were inspirational models, while some are ready-made solutions that could be integrated or used together with proposed artifact. There is also critique for some of the most common operating models of current social media networks and information and communication technologies.

2.1. Self-organization in urban planning

The continuum of general planning theoretical debate, starting after the Second World War and until nowadays, consist of four general paradigms closely related to democratic theories: comprehensive-rationalistic, incrementalist, consensus-oriented communicative and conflict-oriented agonistic. All of them in different ratio are present in the current urban planning practice worldwide and also identified as being relevant in the Finnish context (Bäcklund & Mäntysalo, 2010). In the beginning of the new century, Theory of Communicative Action, has played particularly big role reflecting and shaping a big turn in the course of modern democracies and planning systems - in instance it has been identified that the adoption of Finnish legislation for public involvement in the planning process in many ways was related to it (Puustinen, 2006, p. 193; Saad-Sulonen, 2012, p. 5). However, consensus based decision-making process was never fully realized on a big scale due to the idealistic nature of its underlying concept of universal human rationality. In practice it showed itself to be infeasible in the complex fragmented world of pluralistic realities, with relatively low transparency and communication capacity. Conflict-oriented agonistic paradigm consequently emerged to describe more realistic understanding of existing at a time communicative processes, and acknowledges existence of competition or conflict. Its main idea is that innovation does not

require full agreement between all the parties on the objectives of action, but instead partial exchange zone can be built on the level of achievable mutual understanding, for the first-order purposes. Thus, when at least partial convergence of intentions occurs, limited agreement can be reached, possibly with different or even opposing meanings for each party, but in the end allowing for innovation to happen (Balducci & Mäntysalo, 2013). In this case the role of democratic process is to provide an arena where differences can be confronted (Mouffe, 2008).

As we go further we will see, that there is a new paradigm emerging from the research in ICT, which tries to combine two preceding ones - replacing conflict inherent to agonistic model with collaboration, and as arena for collaboration and democratic process suggesting ICT platforms, e.g. for technology assisted crowd-scale deliberation, complex negotiation, and finding pareto-optimal consensus (Klein, 2017). The idea of pareto-optimal consensus gets back to the ideas of communicative rationality, but only with consideration of emergent high capacity modes of constructive communication, global transparency and open source data, software and technology available for everyone. It does seem also to recall the notion of partial “boundary” agreement from agonistic model. Though the problem with agonistic model is that it relies on conventional negotiation methods, which can lead parties to select pareto-inferior solutions. It is because of the failure of "zero-sum bargaining" frames when applied to complex decisions. “In many contexts, such as buy/sell negotiations, each party typically starts by taking an extreme position, representing their ideal solution, and then make concessions, as slowly as possible, until they "meet in the middle". While this can produce optimal agreements for simple decisions, research has shown that it produces highly suboptimal agreements when applied to complex decisions. “ (Klein, 2017) The model of technology assisted complex negotiations by Klein, has been developed to resolve that issue. It provides tools to systematically explore the design space of potential solutions in self-reflective manner and to benefit from scale and complexity of negotiation incorporating crowdsourcing methods. It does not deny neither of underlying theories in philosophy, democracy or jurisprudence, but only complements them with applied science and new level of complexity. It has its own pitfalls as well, e.g. in case of very large groups there is an issue with preference elicitation, when number of solution options is higher than partakers can possibly evaluate. The other challenge is negotiation mechanisms for complex issue spaces, when issues to be negotiated depend on which solution ideas are being considered. Nevertheless, we believe that the paradigm and methods elaborated by Klein, should be investigated further and tested with our artifact within this work.

In the middle of 20th century citizens of the western world notably started the process of liberation from comprehensive systems of governance and control. According to Szebeko & Tan (2010), in the 1960s onwards there was a growing demand for greater consideration of community opinions in the decision-making process. Phenomena of participatory planning was related to different socio-political movements, focused on community development and grassroots initiatives, which liberated concepts of *public space*, *streets* and *city* in general, offering them a new role and purpose (e.g. Reclaim The Streets). Here it's appropriate to mention the birth of the movements such as "grassroots placemaking" and "tactical urbanism", as they are still on a rise and are prominent as an example of self-organizing urban planning. It was a time denoted by the works of epochal authors such as Jane Jacobs, William H. Whyte and Jan Gehl, who offered their groundbreaking vision on how to perceive and design cities, and why people, not shopping centers and cars, play the most important role in them. Participatory planning has had a long history of development and according to Saad-sulonen (2014), along its history it went through four stages, each with different level of citizen involvement and organizational structure: starting from non-participation, consultative staged participation, collaborative staged participation and currently emerging type of self-organizing participation. If we think about it from more general point of view then we see that self-organizing participation is a point of transition or paradigm shift and it encompasses not even the new methods of participation, but the change of roles and of power relations between state and civil society. Such a shift does reveal many issues with existing practices of participation and with understanding of urban planning as of inherent component of expert-driven culture. Boonstra (2015, p. 67) wrote that current take on urban planning "does not help to overcome the distance between professional planners and civic initiatives, or the contrast between disciplinary and inclusionary tendencies in planning on one hand, and the complexity and diversity of civil society on the other". New model must recognize civil society at least as, if not more then, equal actor operating on the same level together with authorities and governmental body in the process of decision-making. To elaborate on Saad-Sulonen & Horelli, 2010, and Saad-sulonen (2014, p. 45), acknowledgment of self-organization as of a type of participatory urban planning probably would not help us to step far beyond online questionnaires and polls with development of e-planning tools. Still the situation is often so, that planning process is dominated by established governmental and municipal institutions and urban planning experts, who are not interested in competition, and civil society can seldom represent its own interests as an equal actor. The problem with multitudinous and indefinite party such as civil society is that it is usually being organized only on a very basic level and don't have a proper means of self-representation. There are many reasons for it, but, in my opinion, it is mostly because of the natural limitations of conventional methods of communication within big enough groups of people.

To overcome this situation, first of all we would need such a communication interfaces, that allow civil society to be equally organized and coherent power to urban planner and municipality, even without being one legal body – and that would be the first step towards the change of roles. Big emergent civic groups should be capable to stand their position and comprehend their own capacities - and this is when we ask what are the means of management and technologies that would help us to connect with each other, collectively organize and make decisions together. And recognizing communicative and organizing potential of everyday technology such as social networks, wikis, etc. can be a good starting point in our exploration.

2.2. Technologies for networking and self-governance

There has been great technological revolution along with the development of participation practices in urban planning. Emergence of personal electronic devices, World Wide Web, development of information and communication systems - all of these innovations have played invaluable role in the modern history of humanity and also shaped the ideas of participatory planning. With a rise of ICT participative urban design was expected to boost, considering new level of freedom of communication and self-expression, but first emerged e-planning platforms only allowed more organized and substantive way of carrying out dominant model of consultative staged participation, without providing to the public flexibility to spotlight important for them issues (Saad-Sulonen, 2012). Modern platforms such as Maptionnaire, SoftGIS methodology and various smart-city implementations substantially evolved comparing to the early e-planning developments and already incorporate that feature, getting to the category of collaborative participation platforms. Though digitalization of established practices generally is far to be a cure-all solution, because many successful in the past planning systems, that are being used as models for e-planning technologies, already discredited themselves in the face of challenges of 21st century. These were the challenges of fundamental nature: to recognize broad public as an equal actor in the process of decision-making; to take into consideration informal manifestations of urban life; to revise notion of value in a changing economic and political reality; to process, interpret and use overwhelming amounts of information in a legitimate way. This chapter will consist of the overview of different existing technologies dealing with these issues in different ways, analysis of their core underlying operational paradigms, and my own visions on a perfect technology for self-organizing urban planning.

The first fascinating case of a system trying to overcome the above mentioned challenges will be a smart city platform from Finland named *Happycity*, launched in beta on 2017 (Chaos Architects, 2017). I was lucky to convey an interview with the founder of *Happycity*, Natalia Rincon, in the early spring 2018 and few month later to test their newly launched *Happycity* mobile application. Application starts with a questionnaire on the general demographic information and continues with a newsfeed, where users can see the nearest or most popular ideas on city improvement with a photo, a field for short description of an issue, likes and comments. There is also a button to add a new proposal, specify location and upload a photo for it with a short description. From the website we read that proposed system is designed to give to the people "the power to transform their cities" by organizing citizen engagement and providing e-governance tools. "By combining open and licensed data that different systems are creating with the data that people produce in their living environment (ideas, behavior, sentiments) we produce forecasts that help us take better decisions in the future." (Chaos Architects, 2018). These principles sound promising as they recognize civil society as a crucial actor for shaping expert opinion on strategic urban planning. However, it is not clearly stated, how much it is related to actual decision-making and who is responsible for interpretation of user-generated data in proposed scheme. Later in description this interpretative third party is mentioned as "AI cloud platform with a user interface that allows you to share your ideas about your city and co-create together with your community ". This model tends to embody technocratic mindset, as the role and objectivity of Artificial Intelligence is not elaborated, but seems to be taken as neutral and objective. This approach could have been problematic if we consider AI as a subjective actor. If AI neural network gain its intelligence through the process of "learning" from datasets, given by the developer, then depending on the developer and provided dataset, we can get potentially different results of pattern recognition. Web site also introduces a fair system of licensing for *Happycity* products (which consist of analyzed data and APIs), that allows third parties to buy user data with their consent and with a financial or equivalent compensation through the bonus rewarding system. Although this system can have its biases, it shows well elaborated high-end solution for public involvement and can be good for political or entrepreneurial activity, when gets substantial number of users.

Another good example of innovative participation method was openly exhibited initiative of Tampere City Municipality on public engagement through gamification. In the spring of 2018, I had a great opportunity to meet with Rodrigo Coloma, Urban Planner and City Information Model Coordinator (Suunnittelija, Tietomallikoordinaattori), who provided more information about the initiative. He introduced me to numerous ongoing projects aimed for better interaction with a public,

regarding the issues of urban planning and city development. One of the exhibited video games allowed player to move along a programmed path in the city, seeing it from the fly view, and to pinpoint issues or ideas related to specific places along the way. The other one was an invitation to have a VR bicycle tour around Tampere of a near future. Players had to earn points by riding a bike through array of gates, that were leading them along all the currently planned and work-in-progress projects, to let them feel the scale and experience spatially all the public spaces along the way. The other VR project was also quite impressive as it was immersing players in real-scale VR Tampere City, to let them literary change it real-time. They were given special 3d brush to select and install new elements of street furniture, add or remove greenery, sort out and apply different types of cladding and pavements, place new building masses and much more. We were also introduced into the projects of children engagement, where groups of children had to design the Tampere City of their dream, in the Minecraft-like world. It has been mentioned that these exercises were very popular and successful amongst the children, who were willing to learn new tools, co-create and have fun together. In fact, all these projects attracted a lot of attention and interest from the public, and served well to declared purpose. Although these means of art and technology weren't making people any closer to real decision-making process, they were great examples of a project on urban education and gamification of urban planning.

Gamified participative urban planning is in fact an established concept within the urban planning practice, but it is often used in indirect ways and for educational purposes only - whether it is open call to build a dream city in simulation games (Hämeenlinna, 2018; Kangasala, 2018) or public invitation to play board games, to establish better communication (Vaasa, 2018). The hints on where to find real solutions for overwhelming challenges of participatory planning could be eventually found in digital games industry and game research. Massive multiplayer online games, such as World of Warcraft count on hundreds of millions accounts registered around the world (Samit, 2014). Digital games have become ubiquitous and persistent in the modern world, successfully engaging almost all age and interest groups into play. Emergent AR multiplayer games, such as *Ingess* or *Pockemon Go* have shown its' power to unite for genuine collaboration people on the streets, that have never known each other before. Perception of game as informal and entertaining activity gives a great opportunity to include informal manifestations of participatory movements within it. The complexity of modern city can be interpreted by game, and big data can play crucial role in it, shaping it's in-game meta-landscape. Augmented reality (AR) multiplayer online game model could fit to all the criteria of proper planning medium within given problematics, but, in my opinion, to find comprehensive solution for fundamental issues of public participation we need first to dig deeper,

and look into more general mechanism behind cooperative online games. This is a mechanism of a human communication, with a game being an ICT medium of it.

Effective solution for given challenges cannot be founded neither by technical means of digitalization, nor by cognitive means of gamification, but on the fundamental level of understanding the human nature and its self-organizing communicative capacities, magnified by technological innovation. Technological innovations and ICT in particular have played invaluable role during modern history, accompanying great cultural, social and economic shifts. Social media networks, instant messaging, blogging, geo-referenced media and augmented reality - all these technologies are largely shaping our reality. But how do they fit our needs and what kind of technology should we design for our decentralized self-governing societies of the future? On March 2018, we have heard a lot about one of the largest social networks of the world, Facebook, and their issue related to illegal acquisition of their users' personal data by a third party for illegitimate political manipulations (The Week, 2018). Despite Facebook's obvious failure to control and preserve flows of personal data, there are much more substantial ethical issues related to the currently working models of social media. One of the most problematic issues relates to their business model, which is based on exploitation of unaware user as of a source of demographic data, that is sold for target marketing purposes to increase level of users' consumption for the benefit of commerce. According to Rigi (2015) and Fraysse (2015) "what they are selling in Facebook is derived from our sharing, i.e. data about our likes and interests, and it goes essentially to advertisers. They are operating not in the production of value, but in the sphere of realization or circulation of value, i.e. helping sell what capitalism produces" (Bauwens & Niaros, 2017, p. 9). Thus entrepreneurship in collusion with everyone's beloved social networks easily turn into insatiable evil, while their initial purposes stay positive - to provide services, goods and communication means for people on demand. The abovementioned ethical problem however exists for much longer time than the social media networks by themselves - this is a heritage of the 20th century industrial and consumerist socio-economic paradigm, recently exposed through the lens of modern technology. It reveals expert-driven culture where supply defines demand, and where everything is done on behalf of people and seemingly for people, but never with consideration of real people's needs and opinions. It also reveals apparent objectification of a personality within this paradigm: as a target of marketing, tool of politics and asset of economy.

Our goal must be to rethink social networking in the frames of modern reality, to make it a tool in our hands to mobilize ourselves for making the world a better place. Maybe we even don't need

much for it – we can use existing media networking architectures, but replace their top-down "user-centered" structure with a model of collaborative horizontal partnership intrinsic to emerging sharing economies. There are more and more of applications and services that do utilize this emerging socio-economic model. I will give a short overview of those that seem the most appropriate and could be used as a prototype or source of inspiration, or as ready-made solutions to integrate or use together with subject of this research.

Useful examples that I use as a prototypes along this work, are a dating applications, and in instance Tinder. Tinder is a location-based social search mobile app that allows users to like or dislike other users, and allows users to chat if both parties accordingly liked each other. The official web site puts it like this: "Meet new and interesting people nearby. Swipe right to like someone or swipe left to pass. If they swipe right too then it's a match. Only people you have matched with can message you" (Wolfe et al., 2012). The concept seems pretty universal - to find a convergence of intentions (in this case of dating) amongst unknown people sharing the same physical space, limit convergent groups by appropriate number (in this case two) and then to initiate communication between members of group for realization of their shared intentions. Here it is suitable to cite Healey, 1997, to show analogy with ideas on urbanism "What may unify people from diverse backgrounds is that they share a physical place in which they live and work and they often share a concern for the development of this place, despite having different moral orders". What exactly people can share within common physical space and despite their different moral orders is an open question: is it an intention to find a romance or concern for their common environment, or anything else - we just need to ask that question people by themselves. That is why this project started as an idea to create "urban planning Tinder" where the people would group around common intentions that they are free to identify themselves. Though if we start analyzing Tinder and other dating apps of similar mechanics we get to realize that the design of a system in its details largely shapes the way the app is used and consequently the way relationships are organized. Tinder is in fact quite notorious example of dating application, as it is said that it fosters hookup culture (Grigoriadis, 2017). For us it seems obvious consequence for its operating system, where social search is organized around selection of best looking photos and almost absolute elimination of any semantic information. Also, as Tinder does not incorporate any social capital or trust economy, it does not as well stimulate for a long term relationship. But, for example, in the case of dating app Appetence, the outcomes of interaction could be in fact opposite to ones of Tinder, as its rules guide users towards more semantically rich relations. They cannot see the picture of people they chat with unless they have spent a decently long time with them in the process of communication. There is also a dating app

called Bumble, where the privilege to start messaging is given only to female users and it has a very different effects as well. We believe that the analytical models of the Theory of Games would be the best to investigate the flaws or features of relational systems of such kind, as well as for our own artifact. Setting up initial rules of the game we often determine its further dynamics and outcomes on a statistical level. Thus it is our responsibility to set proper rules for our purposeful game.

I would like to introduce two more brilliant programs related to our case under the names Loomio and Co-budget. They were developed by entrepreneurial coalition called Enspiral Network, that has started with an aim to help people to do socially meaningful work collectively (Enspiral, 2010). Loomio is a decision-making software designed to assist groups with the collaborative decision-making process (Enspiral, 2014). It is a free software web application, where users can initiate discussions, polls and different customized voting and planning systems. As the discussions progress to initiating a proposal, the group is being informed through various updatable graphs and charts, depending on type of proposal. I have tested it during different cases of teamwork and was pleased to realize how easy it is to use and how helpful it can be. It has emerged during the Occupy movements, was crowdfunded and collectively supported by numerous communities and individuals, and also used during Occupy movement in New Zealand. Basically it allows users to create, modify and process ideas, rank the issues, organize the time, etc. in cooperative and transparent fashion. The whole system seems very well designed and thought through and can work well together with any social group/network, and I believe with the subject of this research. I will analyze it in detail later in the design phase to either embed it in target application or to bridge two ecosystems. The same goes for Co-Budget (Enspiral, 2017), which is similar solution for collaborative financial decision-making.

One more thing to mention is an emerging research field called ‘social computing’ which is concerned with the interrelation of social behaviors and computational information and communication systems. It is based on creation or simulation of social contexts through the use of software and technology, and further analysis, design and prediction of such socio-technological systems. One of the prominent works in this field, much related to this research, is focused on design and evaluation of tools for technology assisted crowd-scale deliberation and decision-making. Professor of MIT Center for Collective Intelligence, Mark Klein, is describing and developing digital tools for pareto-centric decision-making, complex negotiations and constructive deliberation of a large group scale, with a help of the Deliberatorium digital platform. In the intro to this platform he features a lot of constructive critique towards currently existing social-media networks, as they “**...**

fail badly when we try to engage large crowds in deliberating about how to solve complex problems, typically generating huge volumes of highly redundant disorganized content of very mixed quality, making it prohibitively expensive to find the 'good stuff', as well as difficult to measure and improve how well the crowd meets the customer's needs. This problem plagues a broad swath of institutions, including news media, business, government, and NGOs" (Klein, 2018).

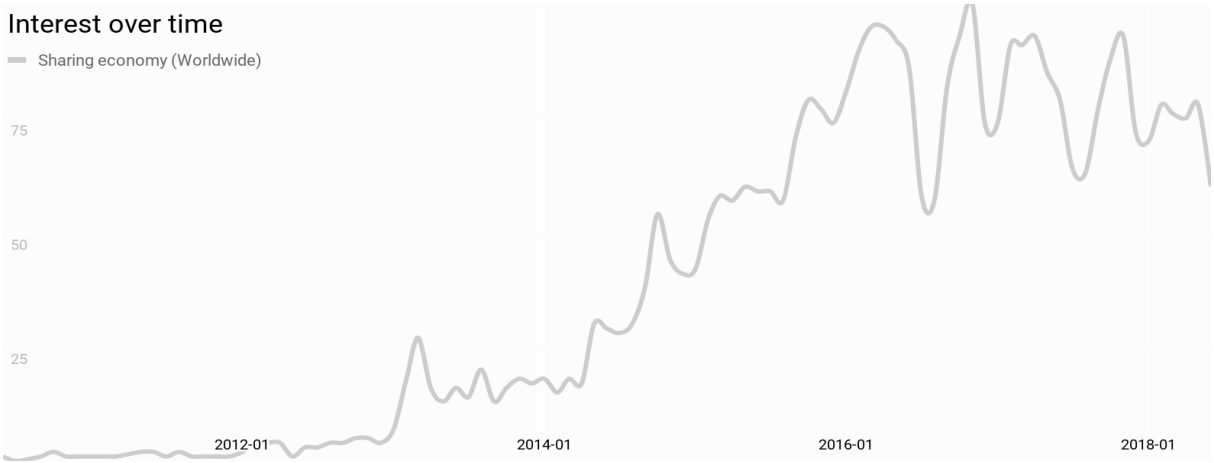
Big part of Klein's research work is in fact dedicated to critics of existing ICT, especially their incapability to cope with any constructive deliberation/negotiation within any medium/large scale groups of people. "While the Internet now provides the cheap, capable and ubiquitous communication infrastructure needed to enable crowd-scale deliberation, current technologies (i.e. social media tools such as email, forums, blogs, and so on) generally result in very poor deliberation outcomes, characterized by large volumes of disorganized and low-quality content, haphazard evaluation, toxic interactions, and such debilitating emergent dysfunctions as clique formation, groupthink, polarization, and deadlock" (Klein, 2018). He states several reasons for these problems, e.g. current tools do not provide technological support for crowd members to work together to collaboratively develop new ideas, but use a contest frame which actually "disincentivizes" collaboration. There is also an issue with unsystematic exploration, as current tools do not provide ways to systematically explore the design space of potential solutions; "small voices" issue, when lots of redundancy crowd out good ideas from smaller groups. There are issues with "extremization", when participants tend to push their own or group-favored ideas, rather than seek win-win ideas; balkanization, the phenomena when participants self-organize into sub-groups, wherein ideas rarely cross-fertilize across groups. This can be caused by the structure of existing social media tools ("filter bubbles") or by people's tendency to find groups they can relate to ("homophily") (Klein, 2018). "Current social media technologies do not provide any inherent support for systematic, well-reasoned evaluations of solution alternatives. On the contrary, fallacious arguments are presented as fact and not challenged, undercutting participants' ability to accurately evaluate which solutions are better than others. "

To develop a solution for these challenges Klein combines ideas from argumentation theory and social computing and developing web-based deliberation platform 'Deliberatorium'. The definition of deliberation is "the activity where groups of people identify possible solutions for a problem, evaluate these alternatives, and select the solution(s) that best meet their needs" (Klein, 2017). He states that deliberation processes have not changed substantially for a very long time in the history. In most of the cases it is about those who hold power, deciding on policies behind the cabinets

doors, and then competing for the most beneficial for them options by engagement of wider support. In this situation most of the people, affected by decision-making, have no possibility to input their own propositions and opinions. In the modern world it is increasingly inadequate approach, as the scale of complexity of the problems we face is overwhelming, and many important ideas and perspectives, that would allow far superior solutions are simply not incorporated. Including a wide public in the scale of crowds (hundreds, thousands or more) into deliberation process we unveiling a great potential to do much better. According to Klein, 2017 “it is because crowd-scale interactions have been shown to produce, in appropriate circumstances, such powerful emergent phenomena as ‘the long tail’ - availability of much greater idea diversity, ‘Idea synergy’ - the ability for users to share and form novel combinations and extensions of ideas, ‘Many eyes’ - production of high-quality results due to the multiple independent verifications, ‘Wisdom of the crowds’ - better judgments made by large groups of contributors, than those produced by the individuals that make them up. These often exceed the performance of experts, because collective judgment cancels out the biases and gaps of the individual members” (Klein, 2017).

2.3. Commons Economy and Value Systems

If we search for “Sharing Economy” topic in Google Trends, we can see exponential growth of interest in it starting from the year 2012. Nowadays we can often hear that notion, together with “commons economy” (Bauwens & Niaros, 2017) in a very different contexts and regarding different spheres of our life. We can hear about it in a discussion on Uber services, fab-labs, 3d printing, bike-sharing, Couchsurfing or Airbnb, self-driving cars, distributed energy production, crowdfunding initiatives or any other peer-to-peer based sharing of access to goods and services. The fact is that we are witnessing the rise of a new socio-economic paradigm. One reason could be that with improved means of communication we finally started to realize, that we share the same needs and intentions, and we can better realize them in cooperation. Another could be of purely economic nature, related to economic advantages of such modes of production and use. As a matter of fact, cooperative practices globally have a revival, boosted by development of technology and ICT.



According to Jeremy Rifkin (2015) and his book The Zero-Marginal Cost Society (Bauwens & Niaros, 2017, p. 12), the trend of decommodification which is best seen in intangible realms such as software or social networking now extends to innovative 'material' production. Once the initial investment is made, either in a renewable source of energy or 3d printer, an abundant flow of output product destroys its own monetary value. Hence Rifkin predicts a future economy of demonetized collaborative commons where market functions operate only at the periphery. Paul Mason (2015) in his book Post-Capitalism, argues that when software and design produced through open and collaborative commons, that can be abundantly replicated , then it should be considered as 'virtual machine'. This means that, once labor is used to produce new software, very little new labor is needed to reproduce it, and therefore, the input of labor is minimized (Bauwens & Niaros, 2017, p. 12). Thus, in order to fit modern reality and to make maximal impact, the model of value production of collaborative commons will be the major economic model for the subject of this research. All the ideas, programs and designs cooperatively produced inside of the ecosystem will be publicly available and free for use and modification for all the members of community, to generate returns for the common value and not for the benefit of few.

The big challenge though is that the world is currently facing the 'value crisis'. It is when in "open and contributory systems many contributors co-create value as a commons which can be used by all those that are connected to networks, but the income is generated by a fraction of the contributors connected to the marketplace, … that do not re-invest sufficiently in the social reproduction of the commoners" (Bauwens & Niaros, 2017, p. 2) In instance we can identify such a crisis in its peak destructiveness in the realm of today's urban planning, when social and cultural value produced by creative citizen communities is then expropriated by the landowners during fully legitimate procedures of gentrification. Or when socially valuable landscapes, public spaces or historical buildings are legitimately demolished to be replaced with a high density real estate for the benefit of construction developers. The same happens even within paradigm of sharing economy, as,

in instance, in case of Airbnb. Landlord who uses Airbnb may have unfair advantage over the neighbors, when extensively uses housing and urban commons to serve his tenants and do not reinvest sufficiently back, generating returns only for himself. To overcome such a value crisis, we need to step beyond capitalist understanding of value and to choose new orienteers and operating principles for our society, rather than resource extraction. We need to consolidate around new commonly affirmed value system and to establish new social contract on its basis.

One particularly interesting idea was suggested by ecologist John D. Liu (Bauwens & Niaros, 2017, p. 14) on how to link the value to its expression in the common monetary system for the sake of humanity: “If we say that money comes from ecological function instead from extraction, manufacturing, buying and selling, then we have a system in which all human efforts go toward restoring, protecting and preserving ecological function. That is what we need to mitigate and adapt to climate change, to ensure food security, to ensure that human civilizations survive. Our monetary system must reflect reality. We could have growth, not from stuff, but growth from more functionality. If we do that and we value that higher than things, we will survive” (Groome, 2016). This seems to be a promising sustainable standpoint to resolve the value crisis and to manage global problems of humanity. But in order to use this model the notion of sustainability must be elaborated and negotiated through, from environmental, economic, social and cultural points of view. “The current format of ‘netarchical capital’ - in which capital no longer produces commodities for sale through commodified labor, but ‘enables’ peer to peer commons production ... to extract rent from it - is similarly ‘socially’ unsustainable” (Bauwens & Niaros, 2017, p. 15). Just recalling phenomena of failed states and overly uneven capital distribution within global world we get to understand how far of economical sustainability are we, when dominant economies legitimately keep extracting resources from the minor states. Just realizing the scale of socially accepted modes of discrimination in the modern societies, when dominant identities keep self-affirming their dominance by resource extraction from the minor groups, we get to understand how unsustainable is the modern culture. Thus the solution for new sustainable model must outline the whole spectrum of considerations from all of these spheres, defined in the process of constructive inclusive deliberation on the global level. “The key underlying shift needed from extractive models, practices that enrich some at the expense of the others, to generative value models, practices that enrich the communities, resources etc., to which they are applied” (Bauwens & Niaros, 2017, p. 3). This is what Bauwens & Niaros call the Value Shift.

There are some great examples of communities around the world that already operate on the basis of new value systems, in different ways embedded in the current global market economy context. We would like to mention here some of those, listed in Bauwens and Niaros, 2017, that potentially can be used as prototypes for our own proposal, or some concepts or ideas of which could be borrowed for our purpose. First example will be the open value network dedicated to the open-source hardware development under the name Sensorica OVN. It rests on a techno-social infrastructure in order to reinforce decentralized self-organization and render the network creative and productive. This infrastructure comprises three main interlocking systems (Sensorica, 2016): (a) a Value Accounting System (VAS), which records and evaluates every member's input and calculates revenues in proportion to each contribution; (b) a reputation system, which determines the behavior within the community and attributes merit in accordance with the collective interest; and (c) a role system, which allocates the arrangement and interrelation of the different activities among the agents, based on their skills and interests (Bauwens & Niaros, 2017, p. 28). This system seems to be logical and pragmatic, thus some elements of it can be borrowed for the development of our artifact. Value Accounting system in our case would be needed to establish fair relational economy, e.g. with any voluntary work being accounted and attributed. Reputation system is important for communities to build trust and long term commitment amongst its members. Role system might be helpful in our effort to formalize processes of self-organization, though we don't know yet what effects it may cause. At least using it in case-specific fashion can be a good idea for better distribution of responsibilities. The other good example of such a unique community would be the Enspiral Network which was created to make "social enterprise ventures and social entrepreneurs work together with shared vision and values" (Enspiral, 2010). It is famous for many things but one in particular is it's incredible open-source freeware toolset for collaborative decision-making and co-budgeting, Loomio and Co-budget, which they until nowadays actively develop and use.

Another particularly interesting approach for Value Accounting System we found in the work on technology assisted crowd-scale deliberation and decision-making, in (Klein, 2017). There author suggests deliberation mapping (also known as argument mapping) for crowd-scale negotiations, which is "a simple but powerful approach wherein deliberations are captured as topically-organized tree structures made up of questions to be answered, possible answers for these questions, and arguments (statements that support or detract from an answer or argument)" (Klein, 2017, p. 5). So for the value accounting he suggests mechanics of a system called Deliberation Task Marketplace: "Crowd members can submit a wide range of deliberation tasks in a Task Marketplace, e.g., to formalize some free text into the deliberation map, check whether a new map post is correctly

structured, fact check posts, contribute arguments for/against an idea, mentor a peer, and so on. Each task will include a virtual currency 'bounty' conditional on it being performed properly… Markets provide a natural incentive for mutual support amongst deliberation participants: if they want to benefit from the crowd, they need to contribute to others as well. In order to maximize their income, participants are incented to bid to take on the tasks that are most important (i.e., have the highest bounties) and that they can perform quickly and well, thereby actualizing an effective task-person matchmaking process. We can manage priority across different activities simply by adjusting budgets: contributors with bigger budgets can offer bigger bounties and get quicker results. Participants will have a natural incentive to acquire the skills (e.g., by taking additional training) needed to fill critical (and thus potentially) lucrative gaps in the market. " (Klein, 2017, p. 11)

Accordingly, this kind of VAS motivates its users to engage in the process of sensemaking, critical analysis, constructive deliberation and negotiation and also learning, developing persons' own intellectual skills. "If moderation could be crowdsourced i.e. broken down into a series of easy-to-do micro-tasks that are distributed redundantly to regular crowd members " (Klein, 2017, pp. 10–11) then members of the network would generate value for the whole community also by performing those accountable routines. Thus the value would be linked directly to the processes of sensemaking and knowledge sharing, to transparency contributions and education. It would potentially lead us to the society where above all stands a common sense and well informed decision making, and where fairness and legitimacy become paramount - and this would be a reliable fundament for mitigation of climate change, and solving any of our global societal problems. This mode of value production, by the means of making meaningful contributions into general discourse, also fits to post-structuralist understanding of the process of 'gaining power'. According to Murdoch (1995, p. 748) and Thrift (1996, p. 25): "Those who are powerful are not those who hold power but are those able to enroll, convince and enlist others into networks on terms which allow the initial actors to 'represent' these others. Powerful actors 'speak for' all the enrolled entities and actors and control the means of representation." (Boonstra, 2015, p. 121)

In regard to economy of our future digital platform or economy of commons in general, it would be appropriate to mention the concept of local exchange trading system (abbreviated LETS). "It is a locally initiated, democratically organized, not-for-profit community enterprise that provides a community information service and records transactions of members exchanging goods and services by using locally created currency. LETS allow people to negotiate the value of their own hours or services" (W.A. Government, 1990). One interpretation and inspirational example of it, is an

emerging social media network under the name Nimses, that was developed and launched in Ukraine on the beginning of 2017. It is location based application, where users can post any kinds of media with attachment to their geolocation, as well as to read and interact with the posts and other users in the near proximity. All the interactions inside of Nimses are based on a virtual currency called “nims”. This name for currency hypothetically could be the reference to the New Associationist Movement known from Kojin Karatani, with its NAM currency, though we have no verified information on it. According to the authors and official website (Nimses Inc., 2018) the name “nim” is inherited from inverted word “min”, i.e. one minute, as one unit of currency is being unconditionally issued to every active user every minute. This way the currency represents the value of a time of human life, which is an interesting example representing ‘value shift’ in action. This way the issuance of a currency is limited and conditions are equal for everyone and predictable. Nims could be used to create location-based posts or to like posts generated by other users nearby, or, alternatively, to advertise or to buy local goods and services, which is basically tangible and intangible realms of the same matter. Therefore, the users collaboratively define value of various community generated posts and goods within ecosystem, while app developers benefit from entrepreneurs, having rent for extended target marketing features. Application developers also promise functionality to convert nims to the real currencies, after the initial coin offering takes place. The fact is that the system is working for more than a year and users can buy goods and services from number of sellers and entrepreneurs with nims currency, so far mostly in Ukraine and Eastern Europe. It does have more than 4 million of users and it’s being in active development stage yet. The system has its own social ecology along with economic system, and outlines 12 principles of community, which encompass ideas on empathy, care, respect, value of human life and its purpose. Just observing notable progress of this experimental project, we can state, that carefully designed location-based social media network, combined with a virtual exchange trading system, can embody very lively and sustainable value system, even when integrated in global socio-economic context.

This also fits to the conceptual framework from Kojin Karatani (2014), which describes four fundamental modes of exchange in their evolutionary chronology. Briefly these are: the mode of community, based on the reciprocity of the gift or ‘pooling’ through commons; the mode of state, based on ruling and protection, ‘plunder and redistribute’; the mode of market, which represents commodity exchange and capitalist market; and the mode of association, which transcends the other three - the return of community mode at a higher level of complexity and integration (Bauwens & Niaros, 2017, p. 17). He posits an ongoing transition towards mode of association, which is a mode of exchange that integrates the preceding ones, but is dominated by the pooling that was originally

dominant in the early nomadic groups, and calls this modality ‘associationism’. “This opens up thinking about the value shift or value transition, not just as the replacement of one system by another, but as an ongoing inter-modal struggle. The question then becomes, how can we think about a commons transition as a way for the commons to engage the other modalities? Just as the logic of capitalist markets attempts to commodify, the logic of the commons is an effort to commonify. There is evidence of this type of value shift in the current practices of peer to peer based, commons-producing communities“ (Bauwens & Niaros, 2017, p. 18). This evidence we can find in Nimses, as well as in majority of commons systems, described above.

Following evolutionary logic that we found in the historical process of development of participatory planning, we need to realize that it is our responsibility to take part in the design of our digital environments as well as physical urban environments. In best case scenario we must develop our own platforms, that would fit our needs best. This way we avoid situation when third parties extracting rents from our communities, at zero marginal cost of a service, as existing social media platforms do, and this way we are able to reinvest all the returns into further development and the common value. And this is how we get to the main idea and the purpose of this thesis, which is to develop conceptually and practically self-made adaptive technological artifact, that would facilitate the emergence and becoming of bottom-up civic initiatives. The main function of it would be to identify convergence amongst our own demands and intentions, and to inform ourselves about potentials for local cooperation in particular cases of interest. If in some of these cases such cooperation consequently emerges and different cooperatives find efficient legitimate ways to collaborate and to manage inevitable conflicts amongst themselves, then it logically leads us towards the system of complete self-governance.

3. Defining artifact

This work positions itself within various established ontological frameworks, planning and economic paradigms and technological infrastructures. Although they should complement each other and draw more complete image together, this does not eliminate the possibility that some aspects of those systems may overlap or even conflict. As this work is aimed to propose a practical solution for an empirical issue, and is not pretending for novelty in the fields of economy, sociology or philosophy, we allow ourselves to assemble, interpret and exploit conceptual frameworks sometimes in a very literal way and with a certain level of inaccuracy, particularly as a guidelines and means of creation of technological artifact.

3.1. Defining concept

Since June 2018 the digital platform, which is the core subject of this project, has changed numerous work-in-progress names and migrated across many domains and web pages. Nevertheless, it has been developing in a certain direction with a quite definite core concept, even if not always well articulated. It has started from simplistic “Co-map” on June 2018, denoting apparent features of the platform, such as the map and tools for collaboration. As a base for the new platform, it inherited architecture of location-based “matchmaking” social search applications, such as the most known dating applications Tinder, Bumble, Badoo, etc. Thus the next work-in-progress name was IdeaMatch, with the web-site at http://www.ideamatch.me. In effort to better analyze mechanics of existing social search applications, I managed to classify them according to the criterion of their search or declared question behind: e.g. ‘person by appearance’ type - when appearance is the main search criterion, and the question is “what is the best looking candidate for me?” or ‘job by salary’ type, when the user is asking “what is the best paid job for me?”. These kind of questions are quite conventional and introversive, and reflect consumerist cultural paradigm, where society and people are considered to be resource for value extraction for one’s own needs. On the opposite, digital platform that I wanted to develop should have fit better for questions of more global and extravert nature, that don’t have simple answers. These would be inquiries towards outer world, that would serve as a starting points for change, e.g. “what are the problems of my city that I can help to resolve?”. I ended up realizing that all the categories despite their questions must have derived from the very archetypical ‘Man needs Man’, when individual is simply in search of other people, for whatever reason. This was fitting well for my case, as I didn’t want to limit search criteria

in any way. I wanted to let users ask questions themselves, to 'match' with other users, who are concerned with the same question. Instead of searching for the candidate who matches the criteria and answers one's question, user would match instantly with all the candidates nearby who are concerned with the same question. Users would be able to create, join or skip questions geographically related to their location. Joining certain question would mean person's intention to find answers for the same questions. So the first purpose of the platform would be to match previously unacquainted actors, united only geographically, by their common matter of concern, to show them potential for local collaboration and for collective resolution of that concern.

Along these elaborations, I was constantly aware of quite predictable negative effects from any kind of open comparisons of new digital platform to dating apps. But in my artistic search I struggled a lot to identify appropriate metaphor for the concept, to replace "IdeaMatch" name. Idea of "City Echo" appeared eventually, in the middle of October, as more distinctive and ambient and wide enough to reflect the same process, at http://cityecho.co domain. In dense urban environments we often don't have any communication with 99% of our neighbors, already within 100m radius. So metaphorically user would start using app standing in the deafness of non-acquaintance with his own neighborhood/society. Then, user would proclaim his question to the world and society - it is the moment when he posts a question in the app. And then user evaluates the echo that the question generates - how his idea resonates with other unknown people who nevertheless live nearby. And if it does resonate well, and if it happened to be very relevant question which many other users joined, then there is a high potential for initiative group to emerge, who share the physical space and common concern to resolve. The user can be someone who has no questions yet at all, but who wants to learn what are important issues in ones' city. And the user can be anyone having important question, that cannot be answered by oneself - so he is looking for the echo of his concerns and for the allies to deliberate and resolve it. Lately in the beginning of November, I have changed platforms' name one more time, to "Reflection City" (RC), and located it to http://reflection.city directory. It has been a minor change, as generally it still recalls City Echo concept, though it was necessary to better integrate the first and the second parts of the platform.

The second part of the application would consist of tools helping with discussion, crowd-scale deliberation and collaborative decision making. It would allow emergent groups to formulate their common concerns in detail, to come up with solutions, and to reflect on their own group dynamics. After initial process of ideation, the variety of ideas would be sorted and rated by the group members. Embedded tools for data analysis would allow them to trace different positive or negative

trends in a group activity. They would indicate features of ongoing negotiation such as maturity, balkanization, possible presence of non-grounded evaluations or groupthink, and also would expose users' interests/skills that could be potentially employed. "In addition to being able to monitor the "health" of a deliberation, these analytics can generate alerts that guide users to the parts of the deliberation where they can do the most good" (Klein, 2017). This activity in many ways reminds me of participatory action research or citizen science. This tool would allow groups to investigate their own group behaviour trends for their own sake, to reach their own goals in a very self-reflective manner. Methodology behind it is very similar to methodology of data analytics, but modified to be used by actors, who are simultaneously being the objects and the subjects in their research. This can mean, for example, that there will be a certain level of anonymity along some stages of the process, as such analysis relies only on demographical data with no personal footprints. It is also important to eliminate social factors, such as age, gender or social roles of actors, from being considered in the process of rational decision-making. In the end, the app should also incorporate basic tools for organization and planning of events and budgets: with calendars, notifications, polls, etc. After the initiative is realized or abandoned it should not disappear, but documented to be the ground for the next initiatives. Analyzing previous initiatives and their results emerging groups would be able to make better decisions, and as well tools for data analytics would assist in that. To sum up, we would have a whole cycle of self-reflective action research incorporated in our platform: to identify a problem to be studied - to collect data on the problem - to organize, analyze, and interpret the data - to develop a plan to address the problem - to implement the plan - to evaluate the results of the actions taken – and, in the end, to identify a new problem and repeat the whole process.

There could be many potential uses of above-described platform: first of all, people can naturally organize in communities with a people of the same goals or concerns, and then further work together accomplishing or resolving them. Second potential outcome is that local citizens would be able to access an actual information on the needs of their neighborhoods or district, and start providing services and create businesses according to this data. In the end it can be related to formal urban planning processes, as city planners drawing new development/zoning plans can rely on available legitimate geo-based crowdsourced data, which would reflect real concerns of a people in a given area, and to initiate discussion with them, as one of the actors within ecosystem. In the framework of technological transitions of Geels (2002), if different planning paradigms may be understood as local technological regimes within global socio-economic landscape, then with different planning systems representing technological niches, participation method is technological innovation by itself. In this way, following the aim of this work and introducing innovative planning

technologies, we can potentially facilitate change of current technological regimes and contribute to the global shift towards new political and planning agenda. Thus the goal of this thesis is to describe in detail such a technological artifact, implement its prototype and evaluate its performance on the real life cases.

3.2. Setting specifications

The goal of this chapter is to define certain qualitative and quantitative characteristics of a digital artifact designed to assist self-governance in spatial planning – Reflection City platform (short RC). For this we will quote and paraphrase different sources describing related concepts in an effort to interpret them as a set of literal guidelines for app design.

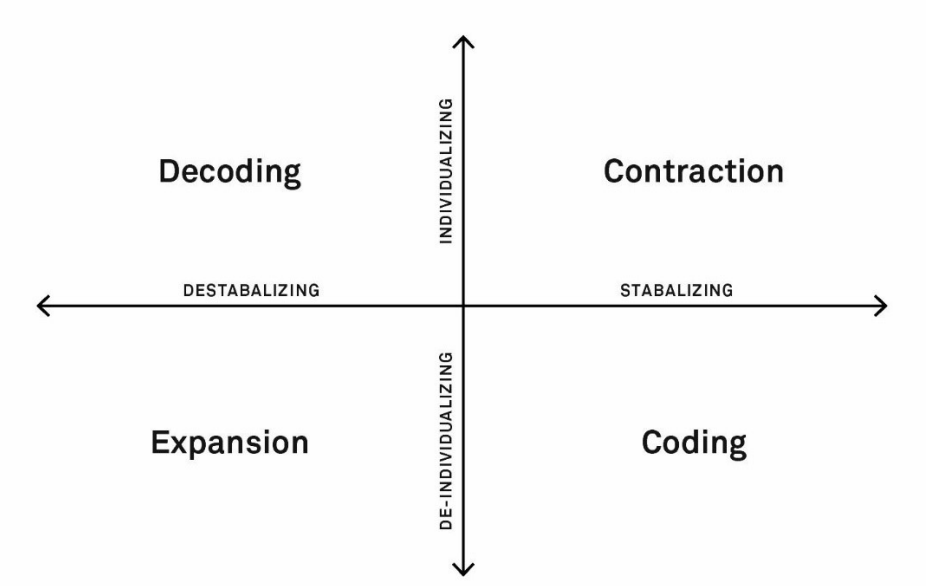
3.2.1 Vocabulary

1. RC, artifact – Reflection City, social networking location-based digital platform, designed to assist self-governance in spatial planning, includes mobile application, web site and backend.
2. User - the factual individual user of the artifact.
3. Actor - user or any other entity, that is capable to affect other actors. Represented in the user interface of RC either as user account, or other entity (actor can be e.g. individual, a person, institution, governmental body, an assemblage, a group of initiators, or the group around initiators, etc.).
4. Inquiry - personal inquiry of actor, could be also question, concern, intention, aim, goal, idea, dream, wish, issue, etc. Represented in the user interface of RC by geo-referenced post with basic information about it.
5. Initiative – derives from inquiry, temporary group of actors united with their physical location and common concern, and a goal to work on it cooperatively. It is represented in the user interface of the RC artifact by geo-referenced post, consisting general information about shared concern, additional information about initiative. If Inquiry is a question than initiative does represent its answer, or process of answering.
6. The process of becoming - the process which starts with declaration of individual inquiry by actor and then evolving towards the emergence of initiative and its realization.

3.2.2 Interfaces

The book of Beitske Boonstra (2015), *Planning strategies in the Age of Active Citizenship,* offers us all-encompassing and thorough analytical model for the research on civic initiatives or any kind of self-organizing urban processes. It's key theoretical premises derived from a mixture where notions from Complexity Theory and post-structuralist thinking are brought together, to make a better sense out of emerging non-linear complex processes within urban planning. For this work though, we will try to turn it over, and use it as a framework for initiation and development of such processes, as a set of literal specifications for our design artifact. We will start by modelling actual process of emergence, development and becoming of initiative, and in it we will rely on description of various forms of behavior within self-organization, as according to Boonstra (2015).

There are four kinds of self-organizing behavior: decoding, expansion, contraction and coding. They can be described as opposite and related, and as sequential and simultaneous: "All behaviors should be simultaneously present in the becoming of a civic initiative, as the behaviors presuppose each other, but also have to alternate in order to prevent the network from falling apart, or becoming disconnected and un-adaptive to its environment. The four forms of behavior should thus be continuously combined, in order to have an effective process of becoming. Decoding and coding presuppose each other, expansion and contraction have to alternate" (Boonstra, 2015, p. 124). We will look in detail what are their core features, and will try to model cognitive/digital interfaces for RC artifact, that would accommodate each of four behaviors.



Four forms of behaviour in self-organization (Boonstra, 2015)

a) Decoding

- D1: “Bifurcation happens when actors suddenly decide to break with existing routines and start behaving in a new, unforeseen and unexpected way. It is also initiation toward a new stable state. Bifurcation is an ideal event that sets in motion a phase transition in system” (From Boonstra, 2015, p. 115; Cilliers, 1998; Heylighen, 2001). Within our artifact it starts when actors publicly declare their inquiry toward established situational status quo. The first interface necessary for that, would create location-attached inquiries - Inquiry Creator.
- D2: “Bifurcation only happens when the fluctuations in a system become abnormally high. It is a combination of determinism (the conditions forced the bifurcation) and free choice (the bifurcation took place). Triggers for bifurcation can be external or internal factors” (From Boonstra, 2015, p. 116; Prigogine & Stengers, 1984, p. 180). Actors will be triggered to declare their inquiries when they have a certain concern, which requires urgent resolution. It means that the question that the actor will answer, by creating an inquiry is simply - ‘what is the most urgent concern or interest triggers me in that specific place?’. Actors who want to join or skip the inquiry would have external factor to react - they will answer the question: ‘is this the inquiry that also concerns or interests me in that specific place?’.
- D3: Actor makes a triple movement during bifurcation:
    - “The actor defines what it wants, which forms the identity of the network, system, or assemblage (the first obligatory passage point)” and in RC ecosystem it is articulated through inquiry.
    - “The actor establishes itself as indispensable in finding this new way of doing (the second obligatory passage point)” – in RC ecosystem to approve seriousness of intentions, the actor will need to invest certain resources in inquiry post, virtual local exchange currency, as well as some personal time and energy to create it.
    - “The actor defines the third obligatory passage point concerning who needs to be taken into consideration in finding new kinds of behavior “– in the RC ecosystem, in the process of inquiry creation, actor obliged to set geographical location for it and set either its audience (max number of people who can see it), or geographical span (radius within which inquiry will be visible to other actors), or lifespan (during what time and for how long it will be visible).

      (From Boonstra, 2015, p. 116; Callon, 1986, pp. 204–206)

b) Expansion

- E1: During expansion the initiating actor looks for allies, and tries to establish connections between them and the network. “Expansion is an investigation into the best way of detecting propositions, making them visible, and getting them to talk. “ (Bruno Latour, 2004, p. 181). “The interessement, if successful, confirms the validity of the problematization and the alliance it implies.” (From Boonstra, 2015, p. 118; Callon, 1986, pp. 209–210). Expansion within our artifact starts from the point when inquiry is created and publicly visible. Then other users nearby can start interact with it during the exploration process. The interface to explore all available Inquiries around actor we will call Pubic Feed. The number of allies within initiative will represent the validity of problematization, and will be also shown graphically on the map within user interface.
- E2: “Expansion asks: do actors want to be involved, want to be placed within (‘inter-esse’) as well? ‘Interessement’ also concerns how allies are locked into place.” (From Boonstra, 2015, p. 118; Callon, 1986, p. 207). Within Public Feed interface we will have “matchmaking” mechanics, with a window showing the details of the nearest available inquiry, and two buttons: one to Join it, if actor wants to be involved, and another to Skip, if not.
- E3: “Expansion increasing internal diversity through dissipation and deterritorialization, the act or process of making something increase in scale. If the outward movement of expansion continues, the actor - network or assemblage increases in scale and becomes deterritorialized. It refers to either destabilization of spatial boundaries or increase in internal heterogeneity. When expansion continues for too long, assembly might lose its internal coherence. Expansion must be timely challenged by contraction” (From Boonstra, 2015, p. 119; DeLanda, 2006, p. 13). As it has been mentioned before, actor has to use its resources when inquiry is created. Also it has to set either audience, or geographical span, or lifespan for inquiry, and the “cost” of inquiry creation will depend on chosen values – on the scale of inquiry. New members of the inquiry will be able to invest their own resources, to distribute inquiry among bigger group of people, wider geography, or expand in time, depending on inquiry type. No inquiry will exist forever, and for this we set the Inquiry Dying Time – the time after which any inquiry, if inactive, will be moved to archive.

c) Contraction

- C1: “The movement of contraction concerns self-reproduction, a strengthening of boundaries and the exclusion of otherness. In social system, this can for instance be a communicative event, as it refers to descriptions, concepts, and ideas articulated that will strengthen the self of the system” (From Boonstra, 2015, p. 120; Mingers, 2002, pp. 283–

286). Third crucial element of the RC ecosystem interface will be the Workshop – interface for contraction, where collaboration, negotiation and organisation would take place.

- C2: Contraction "…concerns the setting of internal hierarchy and order, highlighting the essentials of the system. Contraction refers to negotiation of specific roles of the interested actors and specification of a common identity" (Boonstra, 2015, p. 122). Within artifact common identity will be developed in the Workshop. It would incorporate crowd-scale deliberation tools, user reputation system, value accounting system, role system, skills/expertise accounting, means of interpersonal communication, and means for membership management.
- C3: "Contraction includes articulation of boundaries through choosing representation and publicity. Consolidation is also a requirement of institution, regarding the question whether the network or collective can live together in the current settings" (Boonstra, 2015, p. 122). During contraction a group of representatives can be chosen within initiative, and organization can be formalized if necessary.
- C4: Consistencies between actors' inquiries, understandings and intentions can be indicating the place of initiative on the scale from the emergence to realization (Boonstra, 2015, p. 82). That means that in RC artifact we can incorporate tools to measure and indicate the progress of initiative to its members (for example estimating depth and level of maturity in deliberation maps, etc.), and that would allow to navigate better and to plan the initiative more efficiently. It may also be useful for Workshop interface, as some features of it e.g. crowdfunding or private messaging, can become available only when initiative reaches certain level of consistency/progress in deliberation.

d) Mobilization

- M1: In mobilization "…maintenance of the network as a collective becomes important, as is the constant evaluation whether the network is still able to follow through" (Boonstra, 2015, p. 123; Bruno Latour, 2004). In RC ecosystem mobilization would refer to actual implementation of initiatives' goals. For it artifact needs interface of cooperative scheduling, resource collection and accounting, crowdfunding, co-budgeting – Administration interface.
- M2: Mobilization "…concerns the choice of a certain representation derived from and related to the environment. …[It] is not something derived from the internal dynamics of the system, but finds its sources in legitimate authority, traditions, and rational-legal settings." (Boonstra, 2015, p. 123). Mobilization would refer to self-reflective movement to identify a range of practical solutions of an issue during deliberation, to choose the optimal and consensual one, and to implement it in reality.

- M3: Mobilization "…refers to the elements or schemes that are used in order to turn the initiative into something familiar, something obvious, something that fits existing planning and housing schemes" (Boonstra, 2015, p. 124). Mobilization is concerned with legitimation of the action within existing social constructs, institutions, organizations, etc.
- M4: "There is no universal transcendental meaning of initiative outside of empirical case" (From Boonstra, 2015, p. 80; Derrida, 1988). It means that 'initiative group' is different from companies or political parties as we know them today - it is temporary, dynamic and local, and it generates local meanings only inside and through interactions with environment and external actors. And as such, especially in the process of mobilization, it should avoid associating itself with any transcendental meanings, ideologies, political programs, etc.
- M4: Administration interface should provide access to the database of archived inquiries and initiatives, to use them as tips or templates for mobilization of other initiatives.

After we have identified the core behaviour types within the initiatives' course of action, we need to understand how exactly these different models work together. "When a new proposition comes in and a bifurcation takes place, it first has to go through all the four compartments of the diagram to prove the "seriousness of its candidacy for existence; it demands to be taken into account by all those whose habits it is going to modify [before] it earns its legitimate right to […] become an institution [and] part of the indisputable nature of the good common world" (Boonstra, 2015, p. 125; Bruno Latour, 2004, p. 123).

3.2.3 Principles

"The object of research in this approach is an actor who aims at achieving something in his own interest, but needs others as well" (Boonstra, 2015, p. 72). Starting from this idea we will try to summarize all the characteristics inherent to self-interest or intentions and their role in the process of becoming. If we look at the processes of above described framework these are: *self-organization* from Theory of Complex Adaptive Systems, *translation* from Actor-Network Theory, and *individuation* from Assemblage Theory. Consequently, there are three ways of describing the process of becoming, each of them incorporating unique ideas and notions on it. We will try to distill some of the principles for our platform out of the theories behind them:

a) As in self-organization, deriving from the Theory of Complex Adaptive Systems, emergent systems within our RC artifact must have a following feature:

- P2.1 Initiative is a "response to local interactions, local events, or events that generate local meaning" (Boonstra, 2015, p. 87). It means that any initiative must have a limited focus to the local non-transcendental and non-representative issues.
- P2.2 "A second key aspect of self-organization is distributed control " (Boonstra, 2015, p. 87). There is no centralized control in initiative, all members of initiative take equal part in decision-making (From Boonstra, 2015, p. 88; Heylighen, 2001, p. 8). It is a self-explanatory principle, which should not be misinterpreted though. There still can be different roles and leaders within the initiative. Though the opportunities to impact an initiative must be equal.
- P2.3 Decision making happens "through the competition among actors and through cooperation" (From Boonstra, 2015, p. 88; Cilliers, 1998, p. 94). Decision-making tools must be comprehensive enough to allow as cooperation so and an opposition. The rules of the competition must be equal for everyone.
- P2.4 "In order to materialize, resources have to be collected from and with many actors who may be even part of systems other than the initiative" (Boonstra, 2015, p. 88). That means that artifact must incorporate tools for crowdfunding and also, provide means for involvement and accounting of external funds.
- P2.5 Initiative must have mechanisms for inclusion and exclusion of actors and elements from outside of initiative during the process of becoming. Though this function can be limited only to certain stages of process of becoming, e.g. on the middle or high level of initiatives' consistency.
- P2.6 In the process of becoming initiative is not heading towards optimization of existing structure, but towards higher forms of complexity. Newly emerged order does not replace

any disorder, but adds another layer to the existing structures (Prigogine & Stengers, 1984).“Initiative must organize itself within the context of other civic initiatives, their grassroots, and the political recipients who will implement the initiative” (From Boonstra, 2015, pp. 89–90; Teisman et al., 2009, p. 9). It means, that in the process of becoming, initiative must operate in current reality and interact with existing systems, though creating another layer of organization above existing, e.g. making agreements with other actors of global political and societal process, existing institutions, authorities, etc. and simultaneously accounting them within our artifact ecosystem.

b) As in translation, which derives from Actor Network Theory, emergent actor-network within our artifact must have following features:

- P3.1 “Anything that does modify a state of affairs by making a difference is an actor. The question to ask about any agent: does it make a difference in the course of some other agent’s actions or not?” (From Boonstra, 2015, p. 91; Latour, 2005, p. 71). In the case of our application ecosystem, it may mean that every real-world actor, such as local governments, authorities, businesses etc. who does affect the course of initiative must be registered and considered as an actor related to initiative.
- P3.2 Relationships between actors is the main thing that matters in the networks (Boonstra, 2015, p. 91). The whole digital platform is being designed to facilitate formation and development of relations between physically and/or topically related actors.
- P3.3 “Action is never entirely original, as it is always caused by something else and creates new action elsewhere again: Action is always overtaken. When transporting a course of action, intermediaries do not transform anything, but mediators add their own meaning and thus transform a course of action. The behavior of one agent is explained or caused by the actions of another actor” (From Boonstra, 2015, p. 92; Law, 1994). It is a very philosophical standpoint, which still can lead us towards some important ideas on the interface design. No initiative or idea can pretend to be entirely original, so preserving the ownership rights over the ideas is not feasible and should not take place - on the opposite all the ideas must be open and accessible for everyone. All initiatives could be seen with their assemblies despite their location, and ideas from them are encouraged to be used by any other actor despite location. Participants of initiative can transform course of action by adding their own meaning to it. The behavior of any actor is always related or caused by the actions of other actors.

- P3.4 “Initiatives emerge, constantly change themselves and disassociate. They renew themselves only because of confirmation of associations or by starting up new associations. Newly arising issues, identities, and actors can always be included in initiative. Initiative disassociate when it is not constantly reconfirmed by all sorts of action” (From Boonstra, 2015, p. 92; Callon, 1986; Latour, 2005). In our case it would mean that, in order for initiative to be considered active, it must be constantly reconfirmed by all kinds of actions from its members. Furthermore, it must be a mandatory condition for users to be periodically active inside of certain initiative (scheduling functionality can be useful) otherwise e.g. to be automatically excluded. Also it means that there must be a means of adding new members and actors at any stage of initiatives development, e.g. initiative can have open access to new users in the beginning and administered access at the later stages.
- P3.5 Initiative exists when constantly reconfirmed by togetherness of its members, or when emerge towards order and closure. “Identity of the actors, the possibility of interaction and the margins of manoeuvre are negotiated and delimited in the process of becoming” (Boonstra, 2015, p. 93; Bruno Latour, 2005, p. 203). In the process of decision making the roles of each and every member must be collectively negotiated, as well as possible strategies, partners, etc.
- P3.6 If there is a convergence of interests between actors, then there is a potential to challenge situational status quo (Boonstra, 2015, p. 93). Meaning that if there is a consistent convergence of an interests within a large enough group of people, then they have a power and legitimation to affect any other actors in real world, whether it is established institution or other initiative, or anything else.

c) As in individuation, that derives from Assemblage theory, assemblies within the artifact must have following features:

- P4.1 Artifact inherits fractal logic. Actor and initiative are subjects of the same ontological status but of different fractal depth. Collectively shaped initiative may be understood as individual actor with its own intention, that could evolve towards new initiative of a higher spatial scale, if converges with intentions of the same-level actors. Cooperation between different initiatives of similar directionalities are encouraged.
- P4.2 Initiative is open to any connection or expansion, that are defined in a non-essentialist way and can maintain relations with already included entities (From Boonstra, 2015, p. 94; DeLanda, 2006; Van Wezemael, 2008, p. 168). Neither of the actors inside of initiative should be defined in an essentialist way.

- P4.3 Actors of initiative are self-subsistent (Boonstra, 2015, p. 94).
- P4.4 Initiatives can change in scale or intensity (Boonstra, 2015, p. 94).
- The scale of initiative is determined by extensive properties such as:
    - Number of actors;
    - Geographical span;
    - Length of duration.

  The intensity of initiative is determined by intensive properties such as:
    - Density of connections;
    - Degree of centralization;
    - Degree of materialization;
    - Degree of routinized practices.

  (From Boonstra, 2015, p. 94; DeLanda, 2006)
- P4.5 When dealing with initiative "..asks less what a thing is, but how it has come into being and what it can do" (From Boonstra, 2015, p. 95; Van Wezemael, 2008, p. 168). There is no transcendent meaning over the initiative, so there is no point to question its universal nature. Context that caused initiative to emerge and potential of initiative to change situational status quo does matter. In order to explore the conditions under which something new is able to emerge we need to ask how and why transformation takes places.
- P4.6 Actor is defined by capacity to affect other actors. Actors must be accounted for via the processes that created them and those that maintain or change their identity (Boonstra, 2015, p. 95; Van Wezemael, 2012, p. 99). Social capital accounting system, which we need to develop within artifact in order to build long term trusted relations, can be based on the actors' capacity to affect other actors.
- P4.7 Intentions of the actors that make initiative to individuate belong to virtual. They can never be fully reached or actualized, although they can be reached infinitely close. Intentions of the actors shape a trajectory of initiative development. The more intentions do initiative consist, the more intense and the more nonlinear the process of becoming. (From Boonstra, 2015, p. 96; DeLanda, 2002, p. 29) At the moment when initiative reaches certain level non-linearity and complexity, due to the high level of diversity in intentions of its actors it requires better means of communication, managing and collaboration otherwise it will disintegrate. This is why it is important to use technology-assisted crowd-scale deliberation tools effectively accompanied with the means of crowdsourcing after group reaches 15 ,50, 150 or more members.

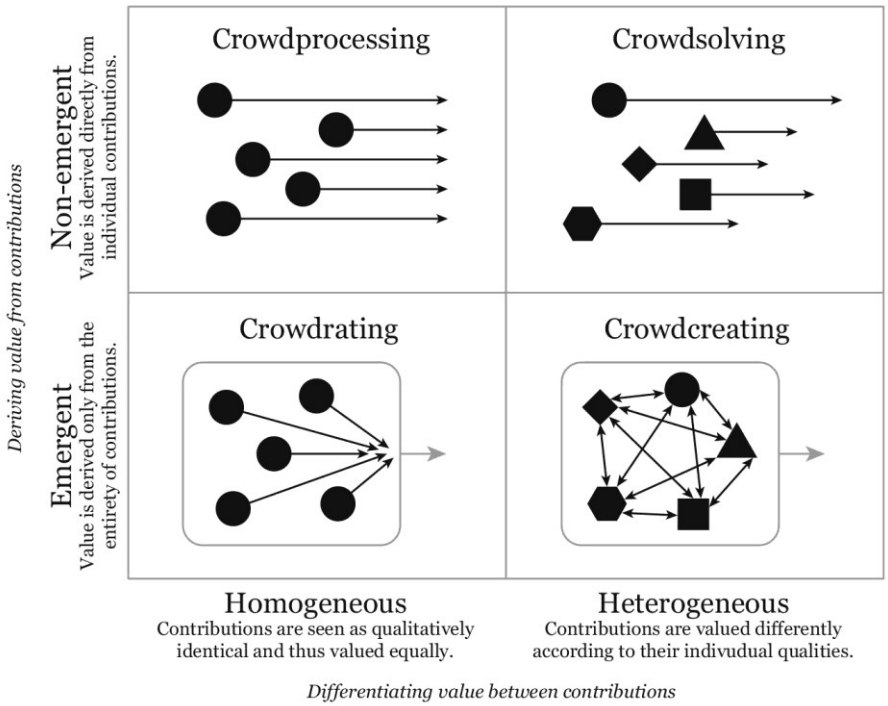
- P4.8 “The actor’s intention which stands for the initial goal and concern of the initiative, is not something that is precisely defined beforehand; instead, it individuates too along the way, becoming more and more detailed and known during the process of group formation and realization” (From Boonstra, 2015, pp. 96–97; Hillier, 2007, pp. 61–62). Neither of intentions by themselves are to be exactly implemented as they were originally defined - instead development of the initiative should be considered as an open-ended non-linear process of becoming of actors simultaneously together with their initiative.

Here we will mention the general concepts and definitions that derive from described in the work of Boonstra (2015) post-structuralist ontologies, that we will use for RC artifact:

- P5.1 Spatial objects such as location, architecture, plans, etc. are actors in the process of becoming (Boonstra, 2015, p. 97).
- P5.2 “All sites are local” (From Boonstra, 2015, p. 98; Latour, 2005, p. 173).
- P5.3 “All sites are connected” (From Boonstra, 2015, p. 98; Latour, 2005, p. 173).
- P5.4 Facts are the result of an assembling and fusing of humans and non-humans around “matters of concern”. “A problem does not merely exist, but is always related to a problem owner: An actor who is concerned about a certain issue” (B. Latour, 1987; Urry, 2003). “Concerns that are always contextual and seen in perspective drive self-organization forward. Problems, concerns, and intentions are crucial elements in the emergence of civic initiatives, which are never neutral or indifferent” (From Boonstra, 2015, pp. 98–99).
- P5.5 “Boundaries of initiative should be based on specific, subjective judgments about what the process is about, who is included and excluded, and how results can be achieved, on the boundary judgments from those involved in the activities in the network and through the account of actors. Boundaries of initiative are delineated in elaboration on what the initiative is” (From Boons et al., 2009, p. 242; Boonstra, 2015, p. 99; Buijs et al., 2009, p. 46).
- P5.6 Actor and initiative are reciprocally entangled in heterogeneous process of spatial becoming. (Boelens, 2009; From Boonstra, 2015, p. 100; Hillier, 2007; Murdoch, 2006)

3.2.4 Approach

The other conceptual framework that should be taken into consideration is the research into crowdsourcing, as there could be found many parallels to the above mentioned theories. E.g. four types of behaviour in self-organization in many ways could be corresponded to four types of crowdsourcing, by its openness/closure and homogeneity/heterogeneity features:



Four Archetypes of Crowdsourcing Systems (based on Geiger & Schader, 2014)

The basic method that we will incorporate throughout the platform is a crowdsourcing of different kinds. Emergent types of crowdsourcing will be used to formalize emergent types of behaviour in the process of becoming of the initiative. To start, crowdcreation may correspond to the decoding behaviour, which is about initiation of the network. Crowdcreation would describe the process when multiple users identify different issues and create geo-referenced posts to declare their intentions to change the status quo of certain matters of their concern. This type of behaviour is expected to generate an abundance of ideas of different scale and quality related to various physical spaces and global themes. After this initial step the process of expansion or interessment starts, which may correspond to the crowdrating. By exploring different ideas proposed by other users, sorting out inappropriate ones and by joining initiatives of concern, users will collectively process the whole abundance of initially generated ideas to stay with a few most important. Initiatives of the highest intensity will proceed in the process of becoming as new emergent systems.

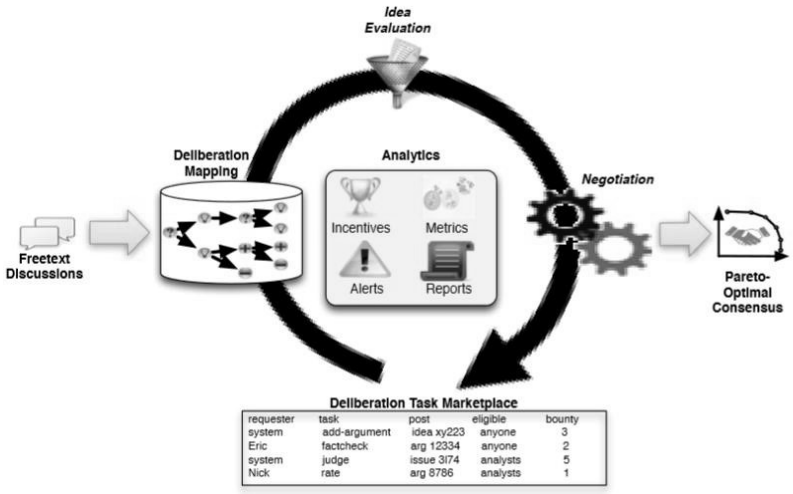
Non-emergent types of crowdsourcing will be particularly useful in the process of contraction and mobilization of the system, which in our case will be represented as collaborative decision making processes, distribution of the roles and responsibilities within initiative and crowd-scale deliberation interfaces. Crowdsolving would correspond to the process of deliberation, when multiple solutions for an issue will be proposed, and then critically evaluated by their appropriateness. The means of crowdprocessing can be fully employed for routinized implications of 'crowd wisdom' through Deliberation Task Market' which we will describe in the next chapter. It includes execution of such tasks as fact checks, argumentation adding, judgments for proposed solutions, rating and filtering. These all are the means of administration and management of the initiative, though implemented with the involvement of the wide public, either from within initiative or also from the outside.

According to Klein et. al., 2017, "evaluations have shown that the need for moderators [in crowd-scale deliberation systems] is relatively low" so our approach may fit for this purpose as well. There is an ongoing research to find the ways on "…how moderation could be crowd-sourced i.e. broken down into a series of easy-to-do micro-tasks (e.g. to check if a new entry repeats a point already in the map) that are distributed redundantly to regular crowd members. We can then use a majority-vote-based mechanism like find-fix-verify to enable high-quality moderation decisions even with a mixed user population"(Klein, 2017). Different methods of data analysis can be used for the initiative management, e.g. we can incorporate indicators of the initiatives' scale and intensity or 'health'. The scale measures and particularly number of users, can be assigned to such constants as Dunbar's scale numbers (5, 15, 50, 150), where 150 is considered to be the cognitive limit to the number of people with whom one can maintain stable social interpersonal relationships. So that, depending on the number of members, initiative will have different category of relational nature, e.g. family-scale, friends-scale, acquaintance-scale, party-scale and crowd-scale for everything above 150. Depending on the category different strategies of initiatives' development could be feasible. For groups below 150 crowd-scale deliberation might be inefficient, but simple negotiation, polling and planning mechanics could be used instead; while for larger groups technology assisted deliberation tools are necessary. The geographical span of initiative can be measured as well as an area covered by members of it, or as an area of concern. It can be categorized as well, e.g. as neighborhood-scale initiative, district-scale, city-scale or as deterritorialized. Depending on whether initiative is of a neighborhood scale or is a deterritorialized global movement, different mechanics for its development must be used. Furthermore, initiatives of different spatial scale can be incorporating each other or can interact in some other specific ways.

The challenge of measuring intensity or 'health' of the initiative is not simple, although with the help of above mentioned Deliberatorium tool, crowdsolving, crowdprocessing and data analytics it is possible. Such an indicator can be highly important and useful for the large scale deliberations as navigation tool, however is not necessary for the small scale ideas. According to Boonstra (2015), what matters in such an evaluation is the density of connections, degree of centralization, degree of materialization and degree of routinized practices. We would interpret this as index of the convergence of the ideas within initiative, index of diversity of initiatives, level of implementation - e.g. as a number of a milestones already reached by the group, or level of user activity. We will describe in detail the mechanics behind such evaluations in the next chapter.

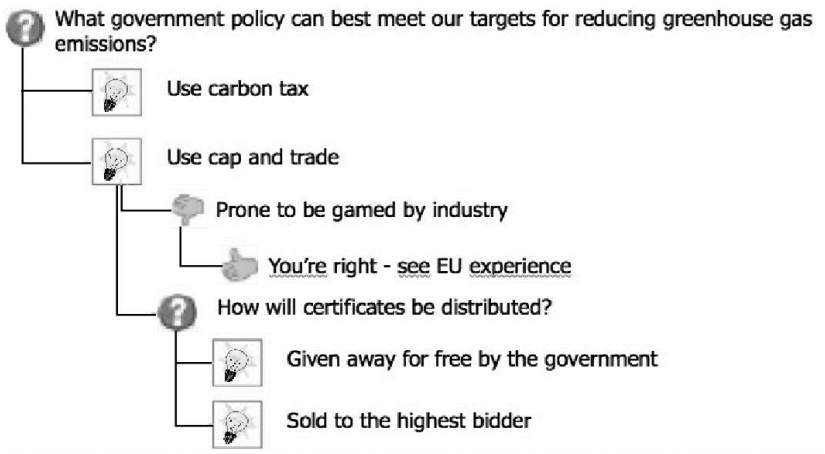
3.2.5 Mechanics

For collective decision-making in a large scale groups it can be appropriate to use the tools developed by MIT Center for Collective Intelligence and Prof. Mark Klein, such as Deliberatorium and the whole ecosystem developed for it. Within that ecosystem "participants interact by posting in a "deliberation map" (a tree structure made up of interleaved questions, answers and arguments, described in more detail below). These users can generate the contributions themselves, or "harvest" them from free text (conventional comment-based social media) discussions. Crowdbased idea filtering algorithms are then used to identify the most promising solution ideas generated by the crowd, and these ideas become the starting points for consensus-making processes mediated by nonlinear negotiation algorithms. If the current set of solution ideas do not lead to agreement, the crowd can loop towards further ideation aimed at resolving the limitations of the earlier solution ideas. All this is supported by a suite of deliberation analytics that data-mine the traces of the crowd's activity and generate customized metrics, alerts and reports to help the participants, moderators and customers of the deliberation have a much clearer sense of where the deliberation is as well as where and how they can contribute best. A deliberation task marketplace can be used to help ensure that important deliberation tasks (e.g. suggesting answers for a critical question, evaluating a promising answer) are performed by the people who can do them efficiently and well" (Klein, 2017).



The architecture of crowd-scale deliberation support technology (Klein, 2017)

The core component of such an approach is deliberation mapping (also known as argument mapping), “a simple but powerful approach wherein deliberations are captured as topically-organized tree structures made up of questions to be answered), possible answers for these questions, and arguments (statements that support or detract from an answer or argument)” (Klein, 2017). It has been mentioned that a critical challenge with crowd-based deliberation systems is that they tend to produce abundance of ideas of widely varying quality. “The role of idea filtering then is to eliminate, as much as possible, the “lose-lose” ideas (i.e. ideas that are not pareto-optimal) so the community has the best possible alternatives at hand when it makes its final decisions” (Klein, 2017). For this purpose, a novel form of limited-budget multi-voting was developed, called the "bag of lemons", where participants are provided with a list of candidate ideas, given a limited number of tokens, and asked to allocate their tokens to the worst ideas (the “lemons”), rather than the best ones. “Empirical evaluations have shown that this kind of filtering is far quicker, as well as more accurate, than rating or traditional (pick the best idea) multi-voting” (Klein & Garcia, 2015).



Deliberation map, Klein, 2017

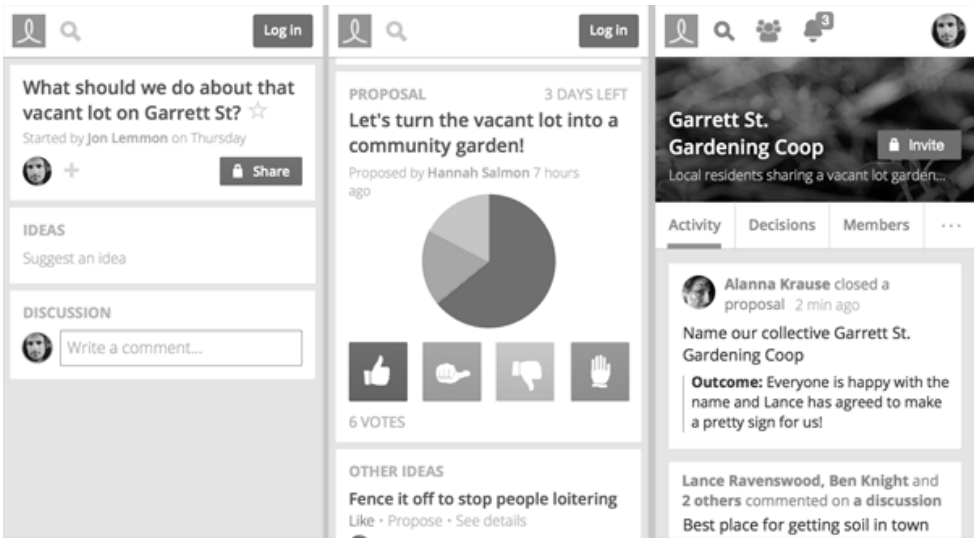
In order to measure the consistency of negotiation within initiative, we can measure the maturity of deliberation map produced by its members, as it is described by Klein (2017). “The maturity of a deliberation map can be estimated by gathering statistics on the topology of the map (e.g. breadth and depth of the branches of the map).” It is also possible to measure balkanization - “phenomenon, when a crowd self-assembles into cliques that ignore or reflexively down-rate competing ideas, can be detected by applying social network analysis to the interactions in deliberation maps, taking advantage of the interaction type information (e.g. agreement, refinement, disagreement) that deliberation maps provide” (Klein, 2017). We can also identify non-grounded evaluations: “this occurs when users rate posts without accounting for relevant arguments and can be detected by observing whether users read, and how they rate, the arguments underneath a given deliberation map post” (Klein, 2017). In the end we can detect the symptoms of groupthink: “groupthink occurs when a crowd converges prematurely on a given (often the first) solution idea, without giving adequate attention to competing ideas. This can be detected at how quickly the variance in attention increases for the ideas addressing an issue in the deliberation map” (Klein, 2017). We can also develop a model to identify users’ field of expertise and interests, by assessing their viewing activity, as well as the ratings of the posts they contribute, which could be a good hint in the process of defining roles and responsibilities.

“In addition to being able to monitor the "health" of a deliberation, these analytics can generate alerts that guide users to the parts of the deliberation where they can do the most good.” Klein (2017), propose to use these kinds of alerts:

- Alert to “notify the contributors in a deliberation about new content they may want to review, such as a new argument disagreeing with a point they made, a new alternative to an idea they proposed, or a new post that drew attention from someone with similar interests.
- Alert to “notify the moderators of a deliberation about potential problem areas, such as an issue where balkanization appears, where groupthink appears to be in play, or where users are getting disengaged”
- Alert to “notify the customers of a deliberation (e.g. the policy makers who convened a deliberation on a given topic,) about which parts of the deliberation map appear to be mature and thus ready to transition to a decision process.”

In the given framework authors emphasise that “in many deliberative contexts, decision-making must not only try to maximize social welfare (the summed utility of the stakeholders involved) but must also seek to avoid decisions that alienate portions of the community. Such alienation can

undercut implementation of the decisions as well as the future cohesion of the community itself. In this context, therefore, fairness and legitimacy become paramount [26]. This suggests that future work should adopt non-traditional solution concepts that try to minimize regret rather than maximize utility." It is a very important standpoint which should be elaborated further, preferably after few rounds of testing of our particular system.



Loomio, tool for collaborative decision making

For the purpose of decision making in the small-scale groups, we propose to use mechanics of Loomio. "A Loomio group is a safe place to have considered discussions and make decisions away from social media. It's a secure and searchable archive of your discussions, decisions, and files" (Enspiral, 2014). It allows to create proposals, incorporate 'time polls' which allow simple scheduling, features many other types of polling, to prioritize initially created ideas, or allows to collectively create milestones or tasks, distribute them and check on completion. Loomio has also a system of notifications, which helps people who forget to participate and gives a little encouragement. It can be used e.g. along with the process of contraction, when identities, roles and strategies are actively elaborated, or at other stages of the process of initiative becoming.

3.2.6 Economy

The first crucial aspect of internal platform economy is related to above described principles and interfaces of RC ecosystem, and aimed to establish decentralized sustainable network. As a predicament it needs a system of basic universal income, where, for example, one coin would be issued unconditionally every hour to every active user. And, in case there are any other ways of to generate income within the system, they should be programmed very carefully to avoid any kind of

uneven capital distribution. So, in the process of inquiry creation, there will be requirement to pay with in-game currency for any inquiry post – to approve seriousness of intentions from user and to make the system less vulnerable to spamming. The price for the post will depend on the chosen target scale for the post. The scale could be set in one of three ways – either as maximal audience (max number of people who can see the post), or maximal geographical span (radius within which post will be visible to other actors), or maximal lifespan (during what time and for how long it will be visible). New members of the initiative will be able to invest their own resources, to redistribute post among bigger group of people, wider geography, or expand in time, depending on its type. This system would prevent any kind of monopoly over information distribution in the network, and eliminate any possible centralized control, which are probably two of the main challenges regarding currently existing social media.

The platform must also incorporate tools for crowdfunding inside of it, thus giving to the users the simplest way of real participation in initiatives. Regarding the management of the funds we can use already developed models of collaborative budgeting e.g. Cobudget (Enspiral, 2017). Also we may need to develop a reputation system or social capital economy, so that it would bring into the platform the aspect of trust, and stimulate users to establish long term relationship. Another aspect of our economic system would be internal economy or value accounting system. There is an interesting solution developed by Klein et. al., 2017 which is related to deliberation map system described in the chapter above and is called ‘Task Marketplace'. “Existing deliberation systems have no innate mechanism to ensure that the crowd members direct their energies to the activities that generate the greatest value. One promising possible solution is to harness the power of market mechanisms. Crowd members can submit a wide range of deliberation tasks in a Task Marketplace, e.g., to … check whether a new map post is correctly structured, contribute arguments for/against an idea, mentor a peer, fact check and so on. Each task will include a virtual currency ‘bounty’ conditional on it being performed properly. This approach has many compelling benefits:

• Markets provide a natural incentive for mutual support amongst deliberation participants: if they want to benefit from the crowd, they need to contribute to others as well.

• In order to maximize their income, participants are incented to bid to take on the tasks that are most important (i.e., have the highest bounties) and that they can perform quickly and well, thereby actualizing an effective task-person matchmaking process.

• We can manage priority across different activities simply by adjusting budgets: contributors with bigger budgets can offer bigger bounties and get quicker results.

• Participants will have a natural incentive to acquire the skills (e.g., by taking additional training) needed to fill critical (and thus potentially) lucrative gaps in the market." (Klein, 2017)

3.2.7 Ecology

In order to define the conceptual narrative for the platform, I borrow some of 'Eleven principles of Placemaking' to rework and articulate my populist manifesto 'Eight Pillars of Reflection City':

1. Vicinity

You can always find talents and assets just near you.

2. Network

You can resolve anything if you find enough partners.

3. Learning

You can always learn – through observation, inquiry and practice.

4. Vision

Whatever you do, always make a vision for it.

5. Simplicity

Aim to find solutions as simple as possible, but not simpler.

6. Assembly

Assemble entities and processes so, that they make more sense together.

7. Persistance

Stay on your path despite external obstacles.

8. Mutability

Always be open to the need for change.

3.2.8 Content

The content of Reflection City ecosystem will fully depend on its users and we cannot predict much about it. But the platform will need to sustain growth of content and frequency of posts, even when there are not much of ideas coming from users yet. Our solution would be to use existing ideas e.g. for urban interventions from Tactical Urbanism, Placemaking or other action-research frameworks, to automatically populate map. Generation of content will be also simplified with "repost" function, which would allow to adopt any of existing globally initiatives to local cases.

3.3. Modelling use cases

Potential uses of Reflection City platform can be of a different nature, depending on scale and actors involved. These can be individuals, institutions, planners, civil groups, spatial objects such as location, architecture, plans and digital interfaces. The function of the app is to establish coherent communication between all these actors. First, to empower individuals and emergent civil groups, facilitating emergence of meaningful relations and providing them with appropriate tools for self-organization and co-creation. Second, technology would document and legitimize informal and temporary relations between actors and their local spaces. Third, it will aim to initiate constructive bottom-up (or horizontal) communication between emergent civil groups and established governmental and municipal institutions. Fourth is educational purpose, as Reflection.City is a platform for citizen science in sociology and urbanism.

On the core level users are regular people, who are asked to reflect on their environments – either social, or physical or institutional. They are also able to access actual information on the needs of the other people in their neighborhoods, districts, cities or the world, to engage with them or to use and repost their ideas. For example, they can use such information to start providing services and create businesses locally according to it. One example can be the entrepreneur, willing to open a business in a certain place. He does not know what is in demand there, but he has many different business ideas: grocery, or organic-food-shop, or bakery, or fast-food restaurant, etc. So in perfect situation when many in that area are using the app, by posting these ideas in that place, he can see how much this or that idea resonates with people living near that place, and furthermore he gets to discuss these ideas with them. Moreover, even without having ideas beforehand, he can come to the site to see what are the main concerns of people in that area. Even if he has no ideas for the business yet and there are no business related ideas in the site of the interest, he can access all the business ideas created in the world and start reposting the ones he likes, until he finds a match with local inhabitants. Another example entrepreneur willing to open a certain type of business - let's say veterinary service and grooming for pets. She may find many various potential places for rent with the same price, but she doesn't know what is demand for these services here or there. So she posts this idea in all potential places and evaluates where the demand is highest. In both cases crucial moment is that entrepreneurs can evaluate the demand and get public support before they make an investment. Other examples would represent civic activists, artists, public figures, neighbors and even strangers from the opposite sides of the world, cooperating to make their lives better together.

4. Designing prototype

Design of the artifact includes complex of tools and interfaces needed to assist self-governance in spatial planning, and includes development of mobile application, web site and back-end server part. Amongst its interfaces artifact will include:

1. **Public Feed -** map with initiatives shown on it one-by-one starting from the nearest. It has interactive functions such as to join or skip listed initiative, or to add your own. It is showing user's real time position and surroundings, nearby initiatives and their stats, color scheme or system of icons for initiatives from different categories, some basic GIS data.
2. **Personal Feed** with all the news on initiatives that user is taking part at.
3. **Inquiry Creator**, the form for creation on new inquiry, featuring fields for the name, description and target scale – either as max audience, max area or max lifespan of post. May consist categorized catalog of all ever created initiatives plus ideas proposed by default, which are proposed to be used as templates or to be at least semantically associated with proposed new ones. May include components of AI to help with finding similar ideas.
4. **Workshop** page, collaborative canvas with numerous tools for communication, collaborative decision-making, planning, deliberative mapping, etc. per one initiative.
5. **Administration** - Interface incorporating tools for cooperative scheduling, moderation, crowdfunding, co-budgeting, etc.

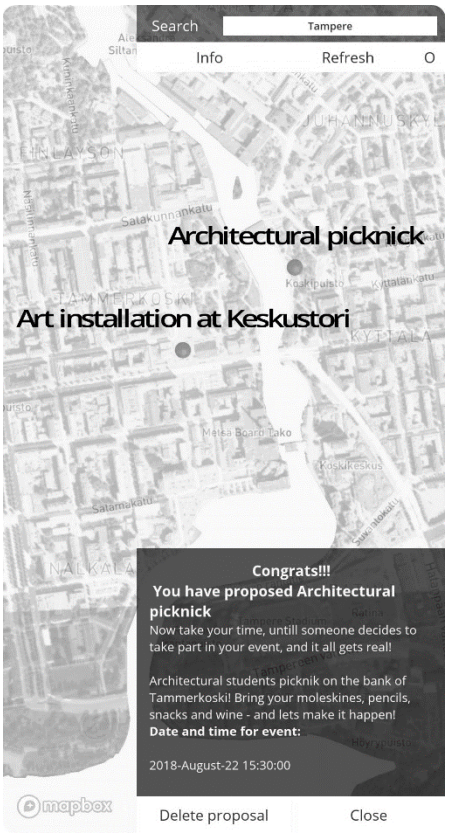
4.1. Design process

The design process for the prototype has been very complex, time and resource consuming, but the result payed off. The whole process can now be divided in two parts: first when I took a role of programmer worked to develop my own application and second when I delegated programming and web development to IT specialist and get into application design and management. The first part took time from the beginning of June, 2018 and lasted almost one month till 27th of June. During that time, I have managed to develop my own application for Android phone on the full scale with Inquiry Creator interface. I started this process by choosing a friendly environment for development, which would be already familiar for me from previous projects - such an environment happened to be Unity (Unity Technologies, 2005).

The screen of the first prototype during the creation of an initiative in a web browser on PC

Unity is a multiplatform environment for game development, so my initial plan was to develop all applications for Android, IOs, and WebGL web site at once, inside of single Unity project. Unity has flexible licensing policy, and is completely free for non-commercial and educational/training projects. The other reason to choose it was its support by MapBox (Mapbox.Inc, 2018) - easily customizable and user-friendly mapping service that has a free license for small projects. It is based on OpenStreetMap technology and it is well integrated within Unity. So I have created custom styled map specifically for the *RC application,* added standard 2d mapping interface template to the project and started to develop app mechanics.

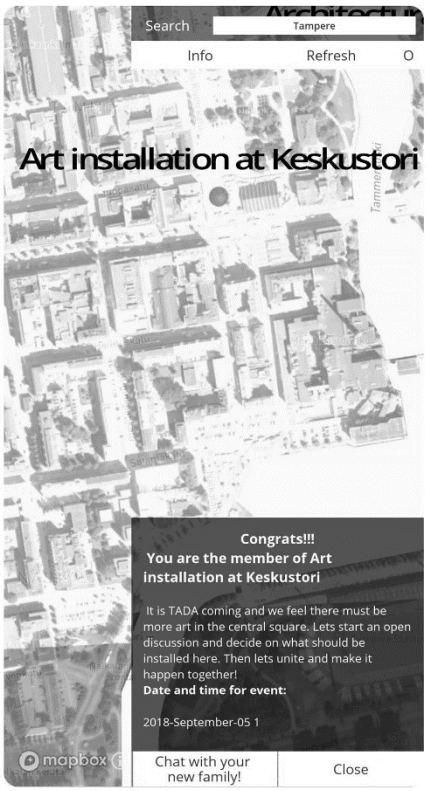
In order to operate and store multiple data entities, such as ‘initiatives’ and ‘users’ I have created MySQL database, at a free tier on Amazon Web Services. At a time, I did not program any server side client and did not use any APIs or encryption, so the whole prototype was based on insecure client side MySQL inquiries. The whole development inside of a Unity consisted of visual interface programming, 2d/3d world creation, interface elements and C# coding, in my case at Visual Studio. After initial stage of development, the *application* was already capable to create ‘inquiries on the map’, watch ‘initiatives’ that already exist and were created by other users, ‘join’ them and edit or delete ‘initiatives’ created by user. On the Inquiry Creation interface there has been a form allowing you to name the it, put a description, choose date and time for meeting and a ‘propose!’ button to publish it. On the ‘Join’ button the name of the user was added to the list of users, that belong to certain initiative, and a pop-up window was greeting you as a new member of certain idea.



The screenshot from my phone

At some point there was a time to start testing the application on a bigger scale and possibly start experiment in the real use cases. That was a critical moment to rethink my role in this project, as I get overwhelmed with a technical problem that arose very soon at the testing stage. The first problem was that even though Unity is multiplatform environment, application that I did design for a month was working properly only at my own phone and few others. Even though I has enabled support for older versions of Android (starting from the Lollipop 5.0 and up till the most recent Android 9.0 Pie), most of the phones I have tested it with had an issues with displaying maps, incorrect interface behaviour, etc. Furthermore, building application for IOs started to seem absolutely impossible as I got deeper into it. WebGL application has had its own issues and was not working properly, so I ended up in situation when the app was properly working only at 3-4 mobile phones including mine.

That is when I had to search for alternatives, and outsourcing programming to professional IT developer was a solution. For this purpose, I thought through the whole concept of the app, and realized that I should focus on the other design aspects and interfaces instead of “mapping” functionality. The map part was very heavy and complex for implementation, but played only a minor informative role. It is crucial to help users to relate themselves to their environment and other initiatives around with a help of map, but it is not a core mechanics that makes initiatives to emerge and proceed towards their becoming. So my second try was focused on development of Inquiry Creator, Public and Private Feeds, and Workshop interfaces without map, that would allow real interaction between the users. Another change was my decision to focus on web development only, without any standalone applications either for Android or IOs.



Screenshots from mobile phone on initiative creation, after creation, joining another initiative and joining chat room of initiative's members

.

As an outsourcing platform I have chosen was UpWork. There I have registered as entrepreneur and published my job offer with a following description:

> Looking for a web developer for a short term non-profit experimental project. The time span of the project is very limited approx. 2-4 days, but the workload is corresponding. The goal is to make a very simple working prototype of a small game-like app in a timely manner.
>
> The idea of the game:
>
> 1. There will be the most simplistic login/registration for users.
>
> 2. Users can create and evaluate "idea proposals" - forms of a type (name, description, place, datetime). All created "ideas" are being stored in database, and are accessible for "evaluation" by all users.

3. Evaluation includes swiping (or alternatively red/green buttons). Swipe left - skip proposal, swipe right - join proposal.
4. On "Join proposal" username is being added to the list of "members" of particular "idea". It also opens a popup window with the button to proceed to the chat with other members, and button to "continue swiping".
5. Every user has a list of proposals he/she joined, where every proposal is complemented with info on date, place, number of participants and button to get to the chat.

At the same day I have had job applications from few programmers interested in collaboration so that we started development from the scratch with one of them on the same day. The experience of collaboration was very smooth, as I knew what precisely we need to do and I was in charge of design of the interface and communication was very well established. In just three to four days we have developed a fully working prototype of an application, that from that moment we called IdeaMatch and published it at the address http://www.ideamatch.me. Everything was set up and well running, so I get to the final phase of full scale testing and real use case experiment.

4.2. Research case

The experiment has taken place during European Architectural Student Assembly, that was going from 21 of July to 4 of August, in Rijeka, Croatia. To introduce you to the whole event I will quote here some basic info from the web site of the assembly:

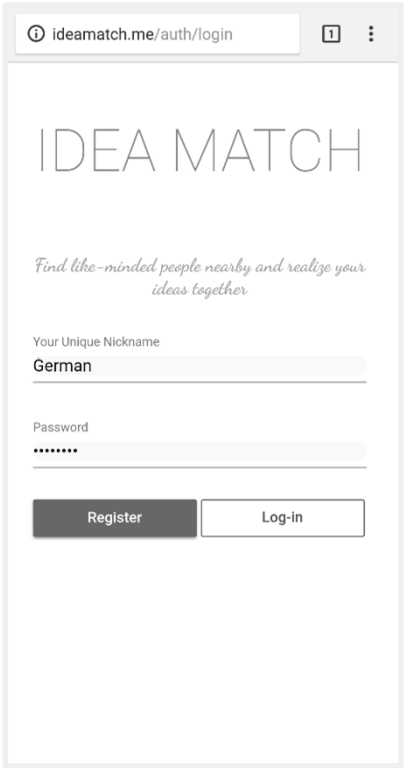
> “The European Architecture Students Assembly (EASA) is a platform for exchange of ideas and knowledge for European students of architecture. This is achieved primarily by the EASA-Summer Assembly and also by the SESAM (Small European Students of Architecture Meeting), and the INCM (Intermediate National Contact Meeting). EASA is not an established organisation but a non-political and non-profit network aimed at bringing people together. EASA is a practical network for communication, meeting and exchange. Here architecture students can discuss their ideas, work together and exchange their experiences concerning architecture, education or life in general.

> By exploring new dimensions of communication, reflection and presentation we can achieve a new perspective of dealing with the architectural profession. EASA represents a holistic agenda of equal rights towards; gender, race, sexuality or perceptive minority. The inclusion and presentation of this ideal ought to be made apparent through the diversity of participants, workshops and lectures. EASA was established in 1981, when students of architecture from Liverpool invited their fellow students from Europe to come and help them solve problems in their city. About 300 students gathered to work on the theme 'starting up the EASA experience'. Since then there have been assemblies in different countries with 400 to 600 participants each year until now."
>
> (EASA, 2018)

The choice of the event was very much influenced by the whole theme of my research and the core theoretical frameworks that I use for this work, such as Actor Network Theory, Assemblage Theory, and Complexity Theory, as the core organizational system of it was far to be conventional hierarchical structure. Throughout the history of EASA it has always been a brilliant example of community of self-organisation and self-governance. It has been prominent as on the exteriority, e.g. in its interaction with hosting cities, so on the interior, where all the infrastructure and services for up to 600 students during two weeks were always organized only by community members. It featured distributed control throughout all of its events and activities and every member of it is able to shape its process of becoming. And the most interesting thing is that it deals with spatial planning all the time, as the output of assembly is often a physical architectural intervention in the city, such as art-installations, art-works, pavilions, elements of street infrastructure e.g. street furniture, etc. It also includes intangible realms of urban intervention such as publishing in the local media, broadcasting on the local radio stations, organizing performances and events for local people inside of the city. To carry out experiment and to join the assembly I applied to be a tutor of my own workshop along the event.

Every EASA takes place in new country, new city and has a new theme. This years' theme was Re:EASA or basically anything with a prefix RE:. It was about recycling, rethinking, renovating, redesigning and much more subjects that were explored along with implementation of more than 30 workshops. The topic for my workshop was to Re:think social media and the way we communicate on the daily basis, and to propose and test a new tool for a better means of constructive communication - communication for self-governance in spatial planning. Under the spatial planning I

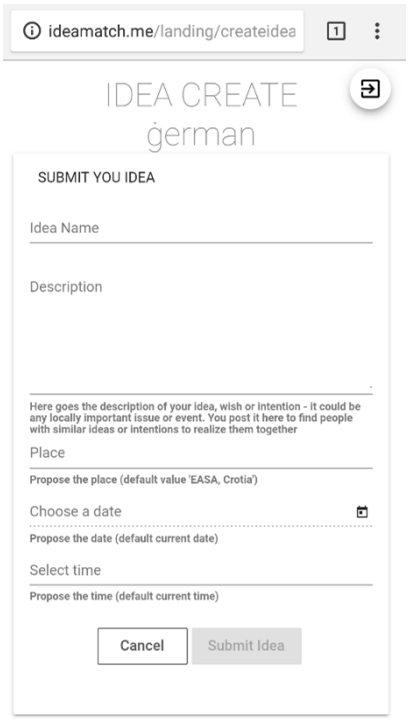
understood not only physical interventions, but all kind of intangible interactions, e.g. of temporary uses of spaces and potentially their activation through it.



First week of the event I was giving a presentation of idea and advertising upcoming IdeaMatch tool along with its development. Though, in three-four days I faced a critical issue with the IdeaMatch application that I already described in chapter above. That is when I have found my collaborator on UpWork, and in a very short time we have made a new IdeaMatch tool. When we finally launched it there were still around 4 days of EASA to come, so in this short time I had to find enough of participants/users and to test it on the highest possible scale. The new tool missed mapping features and all the initiatives were not attached to any location. Though it was not necessary as it was tested during EASA and by people from EASA, where all the events and routines were happening within 500 meters' radius area, and users still had possibility to describe textually specific place to meet, such as "At infopoint", "Near the bridge", etc.

To compensate the absence of mapping features new version of application first time incorporated Workshop interface. In its most simple form it has been made a chat room, where all the participants of initiative were able to discuss, decide and plan together. In total there has been 126 users who registered in these four days and 24 initiatives of different kind were consequently created. All the interactions, such as creation of initiatives and chats, were intentionally made anonymously so that the system worked with a minimum of social restrictions or other external regulations capable to affect its work. This feature is also in line with the initial idea of making an application where the regular people by themselves would do local data analysis, as this kind of analysis must only rely on demographical data with no personal footprints. This is crucially important point as it is the main condition for any action within our system - its non-representativeness. Together with anonymity at this stage of development initiatives featured absence of any categorization, so that the topic for initiative was not restricted or framed in any way. As a result, we have got very diverse list of ideas concerning very different spheres of daily life of the actors. Some

initiatives were concerned with finding a company, romance or friends, some were a joke, while others were concerned with improving the EASA infrastructure.

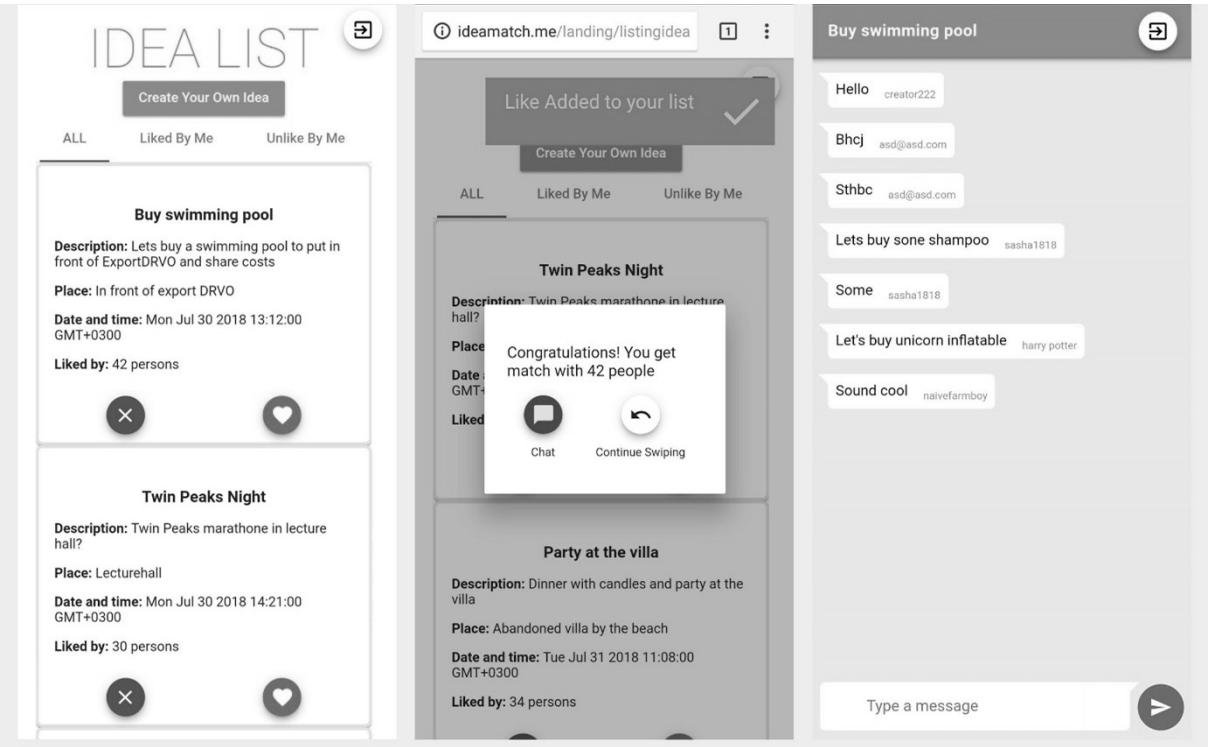


The most of votes (higher than 22 members) were collected by five ideas, two most popular namely were “Buy a swimming pool for EASA” - 42 members and “Party at abandoned villa” - 34 members. The idea of buying a big inflatable swimming pool for EASA community was proposed by someone in the very beginning, just after IdeaMatch was launched. It has been quite a logical demand, as the temperature in Rijeka during July was up to 40 degrees. Despite our accommodation was just near to the sea, Rijeka is a very industrialized city with a big port and there was no access to any beach in the nearby territories, with the closest one in 1.5km distance. Along these four days the idea was elaborated through, and some more features were complimented to initial plan, such as to buy inflatable unicorn together with a pool. Even if it was a joke in the beginning, after 42 people joined that initiative its probability has risen substantially - e.g. the pool of a 300e price, would cost only 7e per member of initiative. Though this idea was never fully implemented - possibly because of a limited time for it, and thus infeasibility of its usage, or due to the absence of leadership. Nevertheless, there were some idealistic people at EASA who bought their own pool despite anything.

The second most popular idea namely “Party at abandoned villa” has had its realization, and I was lucky to be a part of it. Close to EASA accommodation there has been an abandoned villa by the sea, in a good condition and with unknown history. There also was one artist squatting this place for unknown amount of time, and he was seemingly open for collaboration. The event has been proposed in IdeaMatch network and it was also moderately advertised with small flyers and verbally peer-to-peer. Under the leadership of national teams of EASA Ukraine and EASA Finland, the place was beforehand prepared for the guests and DJ-set, lit up with lamps and candles and equipped with sound system. It has been approximately estimated for more than 50 people to be present at the event, and substantial part of them verbally reported to be involved through IdeaMatch application. There has been also going a small discussion/communication in the chat so we can claim it worked. Though we don’t know too much about 23 other initiatives, some of which were very actively

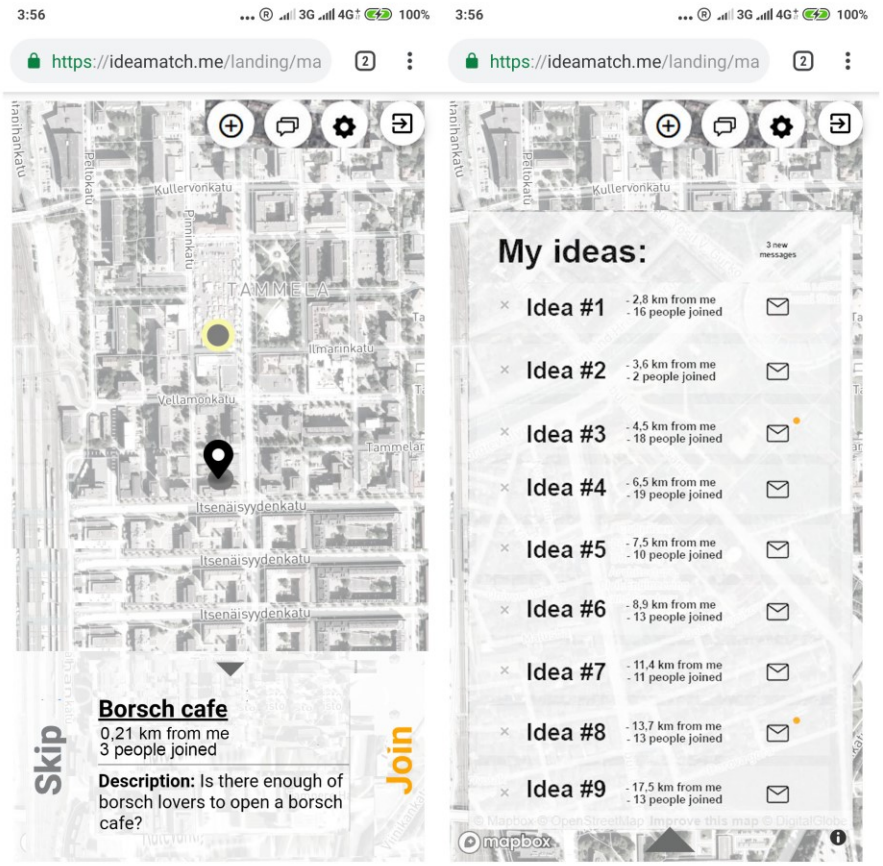
discussed in the IdeaMatch chat rooms. The problem with precise evaluation of experiment results is that we were not able to register whether events happened or not if we weren't present at them, and we can't be always sure about what exactly channel of communication was used to organize them, as often few different channels were used simultaneously. But we did conduct a survey for all the participants of this year's EASA to document events that took place without our presence and with a help of IdeaMatch, to identify what effects did application induced in the community if any, what people think about it and how could it be improved.

The interface of the new app was very simplistic and intuitive though it need a lot more work to be really impactful. There have been very many questions and along its development and use, for example whether the whole list of ideas should be visible or only one at a time, until user either likes it or skips it. The problem with a list of ideas that it does not stimulate users to interact with the ideas and make decisions but allows only to scroll feed as they would do in any other social network. There must be a very clever design for user interface in order for the whole system to work.



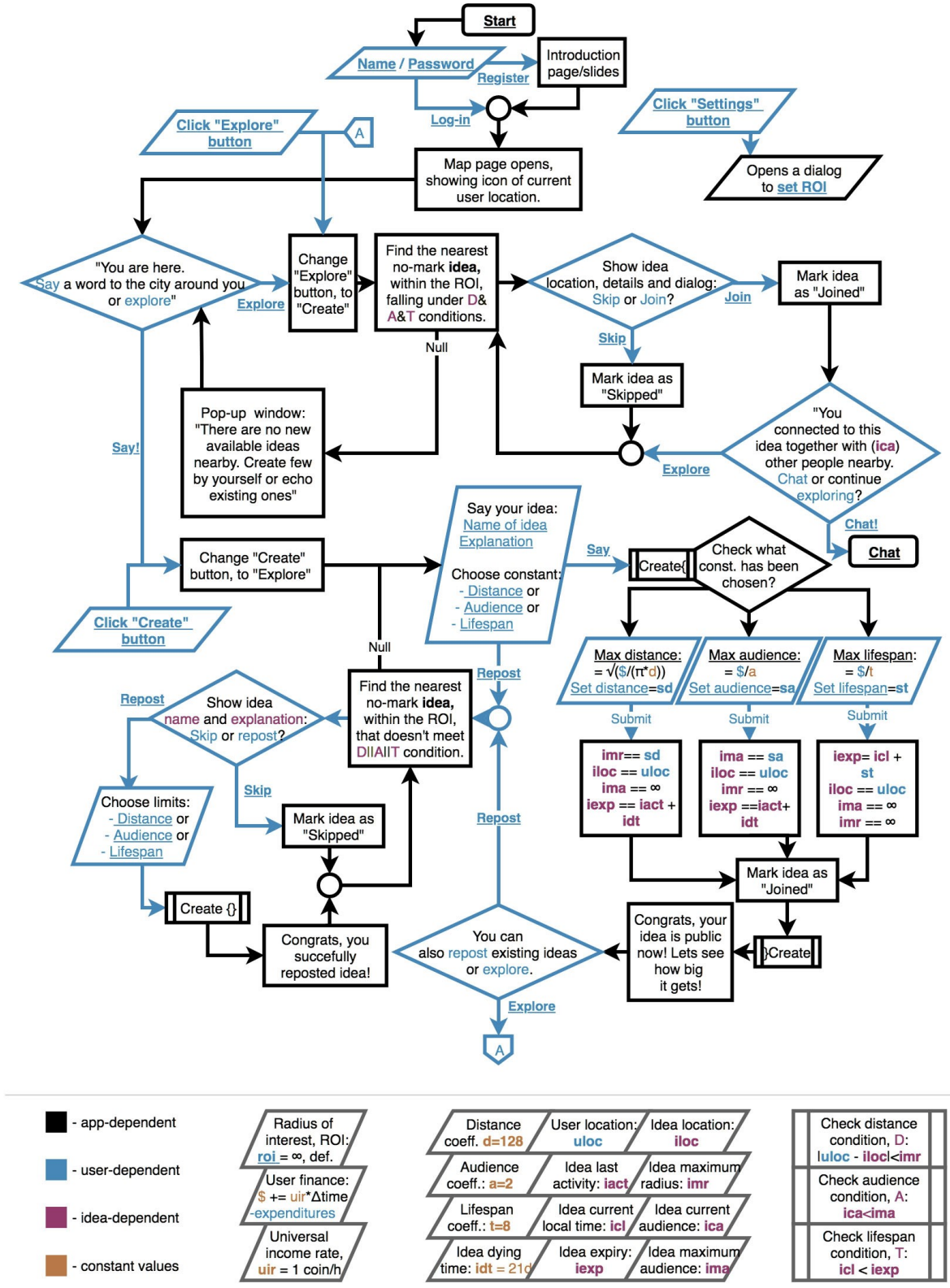
Interface of IdeaMatch application, on June 2018

After the first research experiment I continued to develop RC artifact, together with my collaborator Muhammad Fahad. There was a lot of work and edits, though in the end we have reached completely another level of interface development, and renewed operational structure. So the latest version of the interface incorporated map and “matchmaking” window:



Interface of Reflection City application, November 2018

Trying to make sense out of the whole ecosystem I have made a flowchart concluding its work. It describes three core functions to be developed in the future - "exploring" (skip/join ideas), "saying" (creation of idea), and "reposting". It also describes currency system, where user can buy either lifetime for own or reposted inquiries, or geographical span - from how far it is visible to other users, or the audience - how many people can see it. Now I am looking forward to develop it further and to find new empirical case for the next iteration of research.

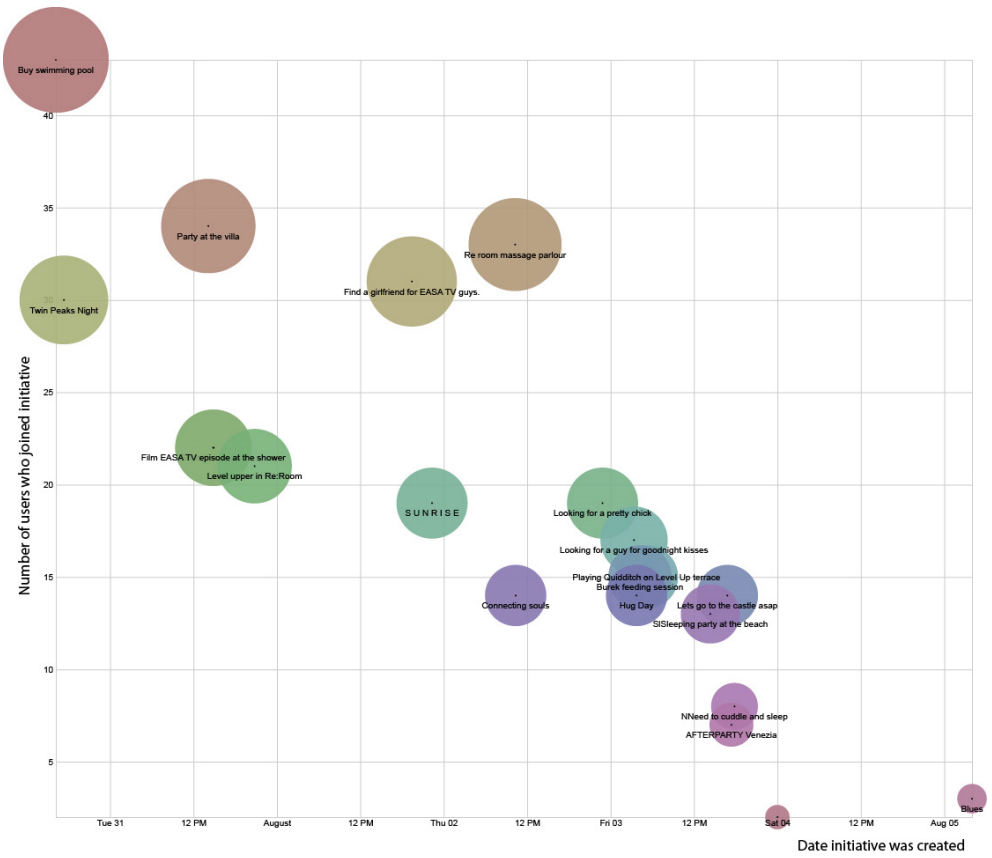


Flowchart describing Reflection City ecosystem, 2018

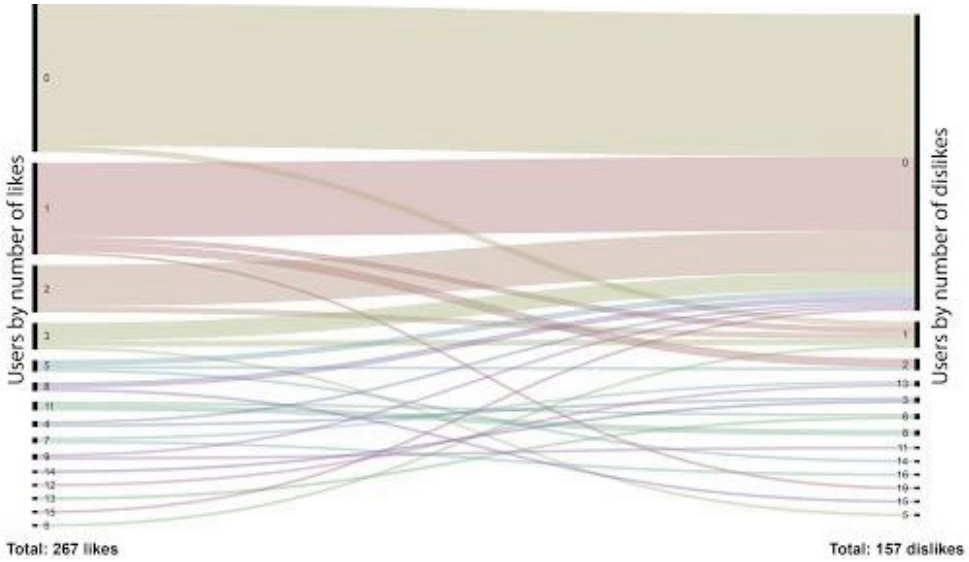
4.3. Results

The data collected by this moment is rich enough to make a first assumptions and corrections. However, such factors as very limited time and bad internet might have affected results quite substantially. We can see these effects on the graph above where there is a clear linear dependency between the date and time idea was created and number of people who joined it. The other point is that application should be constantly tested along its development in many different environments with many different users, as despite its scale and international nature EASA is still having its own individuality and spirit. That is why we need to experiment with different formats and with different communities.

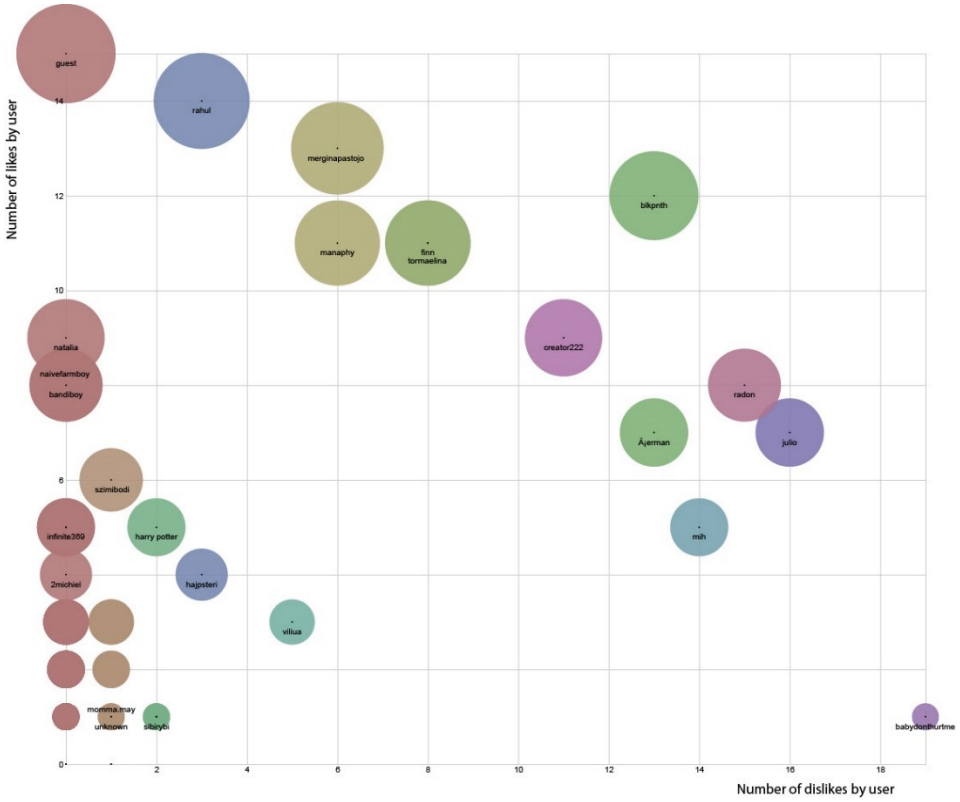
Application and all data collected during the experiment could be seen at www.ideamatch.me . In order to access it you need to register there or login as 'guest' with password 'password' and then try all the functionality of it. In order to try out Android application that I have developed with Unity you can download it following this link www.ideamatch.me/ideamatch.apk , and then copy it to the memory on your own Android phone and install. Big part of my thesis work took actual implementation of this artifacts, which both include many pages and lines of code, and this compensates briefness of this work, of theoretical part and documentation of the experiment.



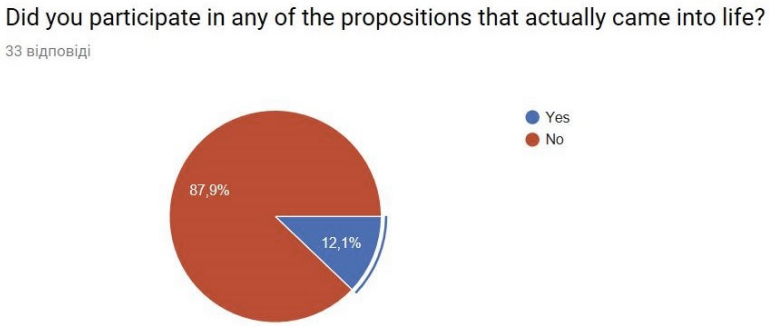
Also results of data analysis show that as we mentioned before interface plays a crucial role in how we use app. On the graph above we can clearly see that while distribution of users by their likes is quite balanced and gradual, we can't say the same about their 'dislikes'. As people have and option not to interact with a certain initiative at all, they better choose not to interact with it then to 'dislike'. The total amount of likes that were made is twice more than amount of dislikes (267 likes against 157 dislikes). It brings us a lot of ambiguity while we try to understand what each of this choices do potentially mean and what is the difference between them. It also reveals the fact that the way how we call and define different functions within app - whether it is "like" or "join" or "support" button may largely affect the way people use it, and the same goes for any button or element of the interface.



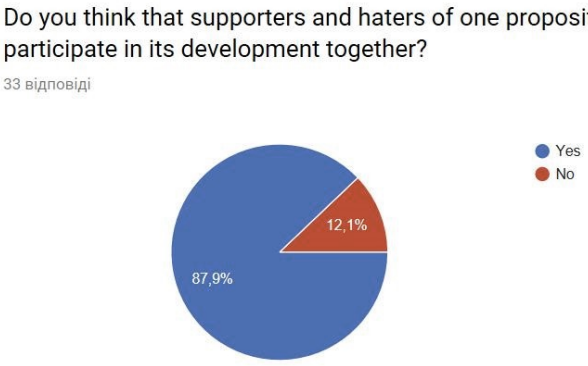
Next graph is showing the overall activity of the users, by number of likes and dislikes throughout experiment. We can clearly see that there as a group of users who were using app the most actively, and were interacting with initiatives in different ways, while the majority of other users were moderately active and preferred only liking some ideas against more active modes of behaviour. This rich source of data in the future would allow to carry not only research on self-organizing initiatives, urbanism or human-computer interaction, but in sociology and psuchology.



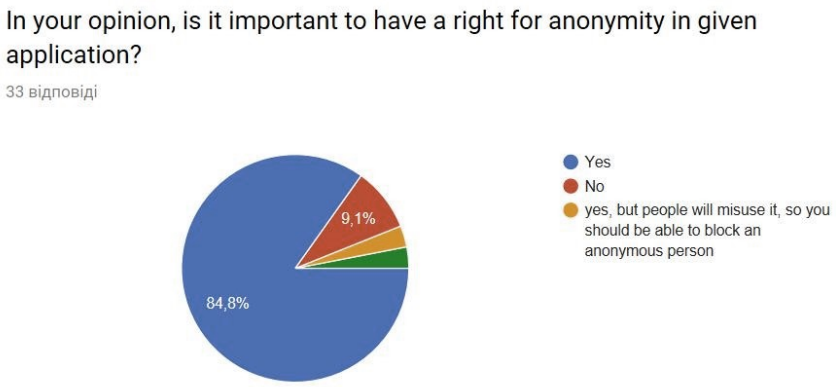
In almost a month after experiment took place I have carried out a survey amongst the users and community, which was accomplished though only by 33 members. Nevertheless some of the results and answers are quite interesting and in this final part of this chapter we will overview them. First of all 12% of respondents reported that they did participate in the initiatives that came into life, which is a good result considering that test was running for less then 4 days. Other non-participation reasons were the absence of notifications in the app, not enough advertising, bad internet as well.



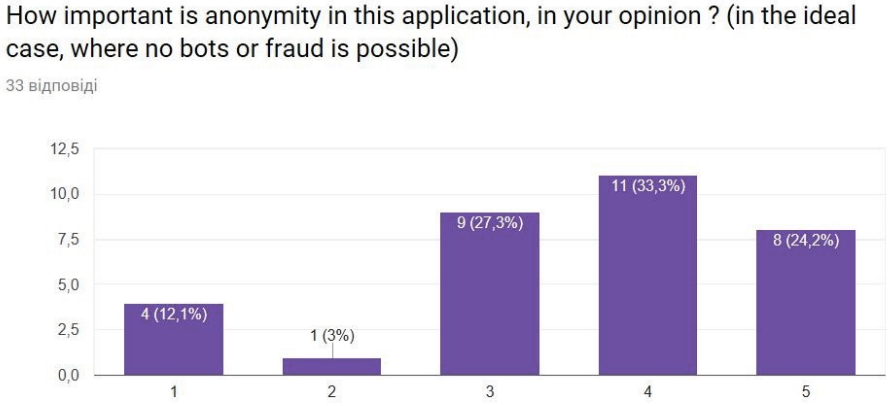
Almost 90% of the people agree that supporters and contradictors of the initiative should be able to participate in its development together.



In this way we make a conclusion that the buttons ‘like’ and ‘dislike’ doesn’t work well for our purpose. In that logic the buttons should be something like “get involved” and “skip”. Though when respondents were asked to propose their own social network button, almost all proposals were emotional expressions.



85% op people agreed that they did appreciate anonymity in the app, and it was important for them. According to some of the feedback this opinion was related to understanding, that by keeping ideas anonymous, the idea and the community become of the main interest.



When asked “Is it important to reveal personal information of initiative members and if yes at what point?” top answers were:

1. From the beginning;
2. It is decided when initiative is created;
3. When members want to;
4. After certain definite time;
5. Before first meeting;
6. In real life;
7. Once the whole party agrees to consider idea more seriously;
8. Once members get certain amount of liking each other or something similar;
9. Once members know that they have a lot in common with each other;
10. Keep anonymous, the idea and the community should be the main interest.

When asked “What do you think is important for ideas to become a reality?” top responses:

1. Group of initiative people and supporters
2. Suitableness of idea for actual needs and atmosphere
3. Human interaction/communication
4. Feasibility of idea and available resources
5. Annoying notifications
6. Agreement amongst everyone involved and tools for decision making
7. Certain undeniable need
8. Creativity and leadership.
9. Spreading of the idea
10. Interest, motivation, drive, dedication, willpower, good spirit, willingness, courage, patience, support, will, ambition

5. Conclusion

To summarize work done within this thesis project, I can say that there is yet a lot to do and it is only the first of many iterations of Action Design Research (or Design Science) methodology pathway. Theoretical premises and specifications constructed in the chapter “Defining artifact” were implemented only on a basic level in final web application, and yet to be developed and tested at the later stages. The idea of such a custom made technology, that would help us to self-organize and find like-minded people in general has been welcomed very well, as by fellow students, colleagues, big international EASA community, so by the people from outside of architectural or urban planning. All this gives me a lot of inspiration to continue with Reflection City experiment (and with beautiful http://reflection.city website). I also feel excited about the fact that I get to realize all my plans regarding this thesis - which started from a deep literature review, in a fields like architecture, urban planning, economy, politics, philosophy, information and communication technology, game studies, ICT and HCI, and then developed into synthesis of a single principal idea out of this huge amount of information. Consequently, I went through development and implementation of technological artifact in two different ways, without any prior knowledge in information technologies. Then participation in the numerous conferences, such as Dwellers in Agile Cities, Urban Studies Days, Urban Education Live, multiple interviews with people from varying fields, and in the end participation and tutorship in the biggest architectural student assembly in Europe complemented by successful implementation of research experiment. All these events and new acquaintances became crucially important part of me, and I am happy now to continue this journey.

Reflections

My studies in TUT were always very intense and fruitful, especially as I was combining them with architectural employment and all kinds of social activities simultaneously in two distant countries. Due to that, for the questions I was always getting very diverse answers, whether from business community or academic environment, from my friends in Finland or in Ukraine, and from my relatives as well. That helped me a lot to find myself and to better specify my real interests and I am grateful for that to everyone who was working with me during that time and helped me on that way. For the last 6 months I have been doing work not related to architecture in its conventional understanding, and I have finally started to enjoy the idea of identifying myself as an architect. What is architecture beyond the forms and boundaries and where could it lead me? These are now the main questions that make me continue my search.

REFERENCES

Bäcklund, P., & Mäntysalo, R. (2010). Agonism and institutional ambiguity: Ideas on democracy and the role of participation in the development of planning theory and practice - the case of Finland. *Planning Theory*, *9*(4), 333–350. https://doi.org/10.1177/1473095210373684

Balducci, A., & Mäntysalo, R. (2013). *Urban Planning as a Trading Zone*. *Urban and Landscape Perspectives*. https://doi.org/10.1007/978-94-007-5854-

Bauwens, M., & Niaros, V. (2017). *Value in the Commons Economy: Developments in Open and Contributory Value Accounting*. https://doi.org/10.1074/JBC.270.32.19158

Boelens, L. (2009). *The urban connection – an actor-relational approach to planning*. Rotterdam: Uitgeverij 010.

Boons, F., Van Buuren, A., Gerrits, L., & Teisman, G. R. (2009). Towards an Approach of Evolutionary Public Management. In G. R. Teisman, A. van Buuren, & L. Gerrits (Eds.), *Managing Complex Governance Systems – Dynamics, Self-organization and Coevolution in Public Investments* (pp. 231–250). London, New York: Oxon, Routledge.

Boonstra, B. (2015). *Planning Strategies in an Age of Active Citizenship*.

Buijs, J.-M., Eshuis, J., & Byrne, D. (2009). Approaches to Researching Complexity in Public Management. In G. R. Teisman, A. van Buuren, & L. Gerrits (Eds.), *Managing Complex Governance Systems – Dynamics, Self-organization and Coevolution in Public Investments* (pp. 37–55). New York: Oxon, Routledge.

Callon, M. (1986). Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay. In L. John (Ed.), *Power, action and belief: a new sociology of knowledge* (pp. 196–233). London: Routledge & Kegan Paul.

Chaos Architects. (2017). Happy City. Retrieved August 30, 2018, from https://www.chaosarchitects.com/

Cilliers, P. (1998). *Complexity and Postmodernism – Understanding complex systems*. London: Routledge.

Coloma, R. (2018). Interview with Rodrigo Coloma, 02.02.2018. Tampere.

DeLanda, M. (2002). *Intensive Science and Virtual Philosophy*. London: Continuum.

DeLanda, M. (2006). *A New Philosophy of Society – Assemblage Theory and Social Complexity*. London: Continuum.

Derrida, J. (1988). *Limited Inc.* Evanston, Ill: Northwestern University Press.

EASA. (2018). European Architectural Student Assembly.

Enspiral. (2010). Enspiral. Retrieved August 30, 2018, from https://enspiral.com/

Enspiral. (2014). Loomio. Retrieved August 30, 2018, from https://www.loomio.org/,

Enspiral. (2017). Cobudget. Retrieved August 30, 2018, from https://cobudget.co/

Epic Games, I. (2018). Unreal Engine. Retrieved August 30, 2018, from https://www.unrealengine.com/en-US/

Faste, T., & Faste, H. (2012). Demystifying “design research”: In *IDSA Education Symposium*.

Fraysse, O. (2015). Is the concept of rent relevant to a discussion of surplus-value in the digital world? In C. Fuchs & E. Fisher (Eds.), *Reconsidering value and labour in the digital age* (pp. 172–187). Basingstoke: Palgrave Macmillan.

Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. *Research Policy*, *31*(8–9), 1257–1274. https://doi.org/10.1016/S0048-7333(02)00062-8

Gehl, J. (1971). *Life between Buildings*. Kopenhagen: The Danish Architectural Press.

Geiger, D., & Schader, M. (2014). Personalized task recommendation in crowdsourcing information systems — Current state of the art. *Decision Support Systems*, *65*(September 2014), 3–16. https://doi.org/10.1016/j.dss.2014.05.007

Google. (2018). ARCore SDK. Retrieved August 30, 2018, from https://developers.google.com/ar/

Grigoriadis, V. (2017, December 31). Inside Tinder’s Hookup Factory. *Rolling Stone*. Retrieved from https://www.rollingstone.com/culture/culture-news/inside-tinders-hookup-factory-180635/

Groome, A. (2016). Meet John D. Liu, the Indiana Jones of landscape restoration. *Regeneration International*.

Habermas, J. (1999). *The Theory of Communicative Action, Vol. 1: Reason and The Rationalization of Society* (Vol. 1). Boston: Beacon Press.

Hämeenlinna. (2018). Hämeenlinna, Cities: Skyline. Retrieved August 30, 2018, from https://yle.fi/uutiset/3-8696412

Healey, P. (1997). *Collaborative Planning: Shaping Places in Fragmented Societies*. London: Macmillan.

Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design Science in Information Systems Research. *MIS Quarterly*, *28*(1), 75–105.

Heylighen, F. (2001). The science of self-organization and adaptivity. In L. D. Kiel (Ed.), *Knowledge Management, Organizational Intelligence and Learning, and Complexity: The Encyclopedia of Life Support Systems*. Oxford: Eolss Publishers. Retrieved from http://www.eolss.net

Hillier, J. (2007). *Stretching beyond the horizon – a multiplanar theory of spatial planning and governance*. Hampshire: Ashgate Publishing Limited.

Jacobs, J. (1961). *The Death and Life of Great American Cities*. New York: Random House.

Kahila, M., & Kyttä, M. (2011). SoftGIS Methodology. *GIM International*. Retrieved from

https://www.gim-international.com/content/article/softgis-methodology

Kangasala. (2018). Kangasalan Lamminrajka-Peli. Retrieved August 30, 2018, from http://www.lamminrahka.fi/suunnittelijoille/lamminrahka-peli/

Karatani, K. (2014). *The structure of world history: From modes of production to modes of exchange*. Durham, NC: Duke University Press.

Klein, M. (2017). Towards Crowd-Scale Deliberation, (June). https://doi.org/10.13140/RG.2.2.12264.06401

Klein, M. (2018). M. Klein. Retrieved August 29, 2018, from https://cci.mit.edu/klein/research/

Klein, M., & Garcia, A. C. B. (2015). High-speed idea filtering with the bag of lemons. *Decision Support Systems*, *78*, 39–50. https://doi.org/10.1016/j.dss.2015.06.005

Latour, B. (1987). *Science in Action*. Cambridge: Harvard University Press.

Latour, B. (2004). *Politics of Nature: How to Bring the Sciences in Democracy*. Cambridge, Massachusetts, London: Harvard University Press.

Latour, B. (2005). *Reassembling the social – an introduction to actor-network-theory*. New York: Oxford University Press.

Law, J. (1994). *Organising Modernity*. Oxford: Blackwell.

Mapbox.Inc. (2018). Mapbox. Retrieved from https://www.mapbox.com/

Mapita OY. (2018). Maptionnaire. Retrieved February 21, 2018, from https://maptionnaire.com/

Mason, P. (2015). *PostCapitalism: A Guide to our Future*. Allen Lane.

Mingers, J. (2002). *Can social systems be autopoietic? Assessing Luhmann's social theory*. The Sociological Review , 50:2.

Mitish, H. (2018a). City Echo. Retrieved November 5, 2018, from http://www.cityecho.co

Mitish, H. (2018b). IdeaMatch. Retrieved November 5, 2018, from http://www.ideamatch.me

Mitish, H. (2018c). Reflection City. Retrieved November 5, 2018, from http://www.reflection.city

Mohseni, M. R., Liebold, B., & Pietschmann, D. (2015). Extensive Modding for Experimental Game Research. In P. Lankoski & S. Björk (Eds.), *Game Research Methods : An Overview* (pp. 323–340).

Mouffe, C. (2008). The Democratic Paradox. *Biomaterials*, *29*(34), 4471–4480.

Murdoch, J. (1995). Actor-networks and the evolution of economic forms: combining description and explanation in theories of regulation, flexible specialization, and networks. *Environment and Planning A*, *27*, 731–757.

Murdoch, J. (2006). *Post-structuralist geography – a guide to relational space*. London, New Delhi: Thousand Oaks, Sage publications.

Nimses Inc. (2018). Nimses. Retrieved August 30, 2018, from https://nimses.com/

Prigogine, I., & Stengers, I. (1984). *Order Out of Chaos: Man's New Dialogue with Nature*. New York:

Bantam Books.

Puustinen, S. (2006). *Suomalainen kaavoittajaprofessio ja suunnittelun kommunikaatiivinen käänne [The Finnish planning profession and the communicative turn].* Espoo: Centre of Urban and Regional Studies.

Rifkin, J. (2015). *The Zero Marginal Cost Society: The Internet of Things, the Collaborative Commons, and the Eclipse of Capitalism*. Palgrave Macmillan.

Rigi, J. (2015). The demise of the Marxian law of value? A critique of Michael Hardt and Antonio Negri. In C. Fuchs & E. Fisher (Eds.), *Reconsidering value and labour in the digital age* (pp. 188–206). Basingstoke: Palgrave Macmillan.

Rincon, N. (2018). Interview with Natalia Rincon, 05.02.2018. Helsinki.

Saad-Sulonen, J. C. (2012). The Role of The Creation and Sharing of Digital Media Content in Participatory e-Planning. *Journal of E-Planning Research*, *1*(2), 1–22. https://doi.org/10.4018/ijepr.2012040101

Saad-Sulonen, J. C. (2014). *Combining Participations: Expanding the Locus of Participatory E-Planning by Combining Participatory Approaches in the Design of Digital Technology and in Urban Planning*.

Saad-Sulonen, J. C., & Horelli, L. (2010). The Value of Community Informatics to Participatory Urban Planning and Design: a case-study in Helsinki. *The Journal of Community Informatics*.

Samit, S. (2014). S. Samit, 2014. “Blizzard reaches 100M lifetime World of Warcraft accounts”. Polygon.

Sein, Henfridsson, Purao, Rossi, & Lindgren. (2011). Action Design Research. *MIS Quarterly*, *35*(1), 37. https://doi.org/10.2307/23043488

Sensorica. (2016). Value reputation roles.

Stenros, J., Waern, A., & Montola, M. (2011). Studying the Elusive Experience in Pervasive Games. *Simulation & Gaming*, *43*(3). https://doi.org/10.1177/1046878111422532

Szebeko, D., & Tan, L. (2010). Co-designing for society. *Australasian Medical Journal*, *3*(9), 580–590. https://doi.org/10.4066/AMJ.2010.378

Teisman, G. R., Van Buuren, A., & Gerrits, L. (2009). *Managing Complex Governance Systems – Dynamics, Self-organization and Coevolution in Public Investments*. New York: Oxon, Routledge.

The Week. (2018, March 20). Cambridge Analytica CEO ‘admits to dirty tricks.’ Retrieved from http://www.theweek.co.uk/92390/cambridge-analytica-ceo-admits-to-dirty-tricks

Thrift, N. (1996). *Spatial Formations*. London: SAGE Publications. https://doi.org/10.4135/9781446222362

Unity Technologies. (2005). Unity. Retrieved from unity3d.com

Urry, J. (2003). *Global Complexity*. Cambridge: Polity Press Cambridge.

Vaasa. (2018). Taiteiden Yö/Konstens Natt/Night of Arts Vaasa. Retrieved August 7, 2018, from https://www.facebook.com/plugins/post.php?href=https%3A%2F%2Fwww.facebook.com%2Fvaasantaiteidenyo%2Fposts%2F1956782541009973&width=500

Van Wezemael, J. E. (2008). *The Contribution of Assemblage Theory and Minor Politics for Democratic Network Governance, Planning Theory*. 7:2.

Van Wezemael, J. E. (2012). Transformative Practice as an Exploration of Possibility Spaces. In G. de Roo, J. Hillier, & J. E. Van Wezemael (Eds.), *Complexity and Planning: Systems, Assemblages and Simulations* (pp. 93–113). Farnham England, Burlington USA: Ashgate.

W.A. Government. "LETSystems Training Pack" (1990).

Waern, A., & Back, J. (2015). Experimental Game Design. In P. Lankoski & S. Björk (Eds.), *Game Research Methods : An Overview* (p. 350).

Whyte, W. H. (1980). *The Social Life of Small Urban Spaces*. Project for Public Spaces.

Wirth, L. (1938). Urbanism as a Way of Life: The City and Contemporary Civilization. *American Journal of Sociology*, *44*(1), 1–24. https://doi.org/10.1177/004912417200100203

Wolfe, W., Rad, S., Badeen, J., Mateen, J., Munoz, J., Moorjani, D., & Gylczynski, C. (2012). Tinder. Retrieved July 8, 2018, from https://tinder.com/?lang=en